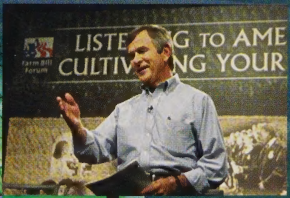
USDA

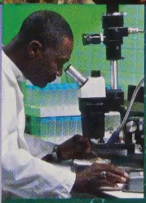
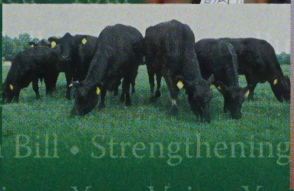
United States
Department of
Agriculture

Office of the
Chief Economist

2007 Farm Bill
Theme Papers

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2007 Farm Bill Theme Papers

"The first step is to ensure that we have all the facts on the table and that is the goal .... My hope is that this analysis will help to focus our national conversation as we work with Congress to develop future farm policy."

— Secretary of Agriculture Mike Johanns

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Foreword

These five Farm Bill theme papers were initiated by USDA Secretary Mike Johanns to present and assess general views and issues advanced during the 2007 Farm Bill Forums convened by Secretary Johanns at 52 locations around the country in 2005. Each paper also includes views and policy ideas that have emerged since then, reviews the operation and performance of current USDA programs, and presents an overview of program expenditures. Each paper also discusses alternative approaches to current policies and programs to help inform the 2007 Farm Bill debate. The alternatives are not recommendations but presented for further public discussion of the 2007 Farm Bill.

Risk Management describes five types of risks agricultural producers face: *price risk; production risk; income risk; financial risk;* and *institutional risk*. The paper discusses instances where government may have a role to play in mitigating these risks, reviews the benefits of current programs and outlays by the Commodity Credit Corporation, and discusses implications of U.S. proposals in the World Trade Organization (WTO) Doha Development Agenda.

The paper evaluates current USDA risk management programs in terms of how well they mitigate risks, their level of comprehensiveness of support, their resource and structural effects, their costs, and WTO implications. Three alternative general approaches to agricultural risk management are discussed.

The **Conservation and Environment** paper details USDA's conservation programs administered by the Farm Service Agency and the Natural Resources Conservation Service. It reviews the historical purpose for USDA of conservation programs, which initially focused largely on maintaining the productivity of cropland. The current era of programs emerged with the 1985 Farm Bill that established the Conservation Reserve Program (CRP), providing incentives to put environmentally sensitive land into long-term conservation use. Succeeding farm bills expanded the scope and funding for conservation programs.

Funding for conservation on land in commodity production increased sharply in the 2002 Farm Bill, which authorized greater spending for several programs created under prior farm bills and established new programs. Conclusions related to current program spending are reviewed, WTO implications are described, and alternative approaches to conservation programs are presented.

The **Rural Development** paper focuses on what drives the improvement in overall rural community conditions, including economic and other quality of life considerations such as the environment, health, infrastructure, and housing. Since rural areas are no longer dominated by agriculture, the rural economy has become highly diverse. Rural America is home to about 50 million people, covering 75 percent of the total land area of the Nation, and extremely varied in geography, population density, and economic and social assets.

USDA is the lead Federal agency for rural development as designated by the Rural Development Policy Act of 1980. To foster rural development, USDA provides grants, direct loans, loan guarantees, financial and technical assistance, and research, mainly in the Rural Development mission area. Other USDA mission areas also contribute to rural development. A review of current program performance and cost-benefits precedes a discussion of three broad alternative approaches to addressing U.S. rural development.

Energy and Agriculture describes the role of U.S. agriculture in energy production and efforts to conserve energy use in agriculture. The paper discusses and evaluates current USDA energy programs and how policy can address issues associated with energy and agriculture. Government incentives have been necessary to help ethanol and biodiesel compete with petroleum-based fuels. Recently, the surge

in oil prices has made biofuels more cost competitive, and these industries are attracting substantial new investment. Environmental benefits, energy security, and geopolitical risks provide a strong economic rationale for increased government support for the development of domestic alternative energy. Two alternative approaches for government support of renewable energy are presented.

Strengthening the Foundation for Future Prosperity in U.S. Agriculture provides an overview of major trends in the food marketplace, strategies that farmers have employed to remain competitive, and key driving forces shaping agricultural markets. These key forces include issues related to international trade, the research and development that lead to creating new technologies, and protection of agriculture from pests and diseases. The paper discusses challenges and issues in preparing farmers and ranchers for this competitive marketplace, especially the next generation of farmers and ranchers.

These papers, prepared by a team led by the Office of the USDA Chief Economist with representatives from the Economic Research Service, the Natural Resources Conservation Service, the Farm Service Agency, and the Risk Management Agency, contain factual, useful information for examining future farm policy directions. The papers are meant to be general in scope and stimulate discussion of policy issues relevant for the 2007 Farm Bill.

1 Risk Management

I Introduction

This paper is the first in a series of briefing papers that assess general themes advanced at the 2007 Farm Bill Forums held during 2005 by Secretary Mike Johanns as well as additional related policy ideas that have emerged in recent months. This paper describes the risks agricultural producers face, describes and evaluates current key risk management programs and tools available to producers through the private sector and government, and concludes with a discussion of general policy alternatives. The alternatives represent generalized approaches to addressing some of the key concerns that have been raised with regard to current programs.

II Background: Risks and U.S. Agriculture Today

U.S. agriculture today continues to face a series of forces that transformed the general economy during the 20th century. These forces include globalization of markets, rapid technological change, global population growth, expansion of regulations, and environmental pressures. These forces and other factors create a variety of risks for farmers and ranchers in the operation of their farm and ranch businesses.

Risks Facing Agriculture. Key agricultural risks are generally organized into five categories.

- ***Price risk.*** Because agricultural prices are mainly determined in global markets, unanticipated changes in global demand or supply of a commodity can lead to unexpected changes in the prices received by farmers for their products.
- ***Production risk.*** Production risk is usually associated with inability to plant or harvest acreage or changes in crop yields or animal production due to environmental variables such as weather, pests, or disease.
- ***Income risk.*** Income risk can be caused by unexpected changes in production or prices received by producers as well as by swings in prices producers pay for inputs such as fuel, fertilizer, or electricity.
- ***Financial risk.*** Farm financial cash flows and net worth can be seriously affected by access to and the cost of debt and by the value of capital, which all can be affected by changes in interest rates and other factors, thus creating financial risk.
- ***Institutional risk.*** Federal and State governments can change laws or regulations producers count on, such as environmental and tax laws or changes in farm commodity programs, creating institutional risks.

Options for Managing Risks. Agricultural producers have a variety of options available to help them manage risks. Ideally, risk management would involve utilizing tools or approaches that: (1) *avoid or limit potential risks,* (2) mitigate the effects of unavoidable risks, and (3) enable *recovery from the effects of risk events* to ensure the continued sustainability of the farming operation.

While individual producers may be able to do little to change institutional risks, they can manage price, production, income, and financial risks by: diversifying production; adopting better crop varieties; adopting other technologies, including precision agriculture and information technology; conserving resources; altering the financial structure of the farm; using insurance, forward pricing, and other hedging tools; and using off-farm earnings to stabilize farm earnings. However, not all of these options are available to all producers. For example, climate in some parts of the country may limit what some producers grow, off-farm employment may not be an option for some

producers or their family members, and some risk management tools may not be available for all commodities or regions.

In addition to differing environmental characteristics and opportunities, it is also important to understand that, financially, agriculture is a very diverse sector. There are a small number of farms that account for much of U.S. farm production. There are a large number of small farms that account for a small share of production, and farming is not the principal occupation of these operators. Due to the wide diversity in producers' individual situations, there is not a single risk management strategy that will be best suited for everyone. Producers face different risks and need different risk management tools at their disposal.

Appropriate Level of Risk Reduction for Federal Programs. An issue in program design is the proper role of the Federal Government in helping agricultural producers manage risk. In a market-oriented economy, business owners face risks associated with their sector and manage those risks using tools provided by the private sector. That is, the Federal Government does not try to eliminate risks for most types of businesses, because doing so would result in overinvestment in risky behavior and cause decisions on resource use that would be inconsistent with market incentives. Attempts to create a risk-free environment could also thwart innovation and investment that would foster greater global competitiveness.

However, risk management tools may be inadequately provided by the private sector, and in such cases, Federal action may be appropriate. In addition, Federal intervention has been based on special risks, such as weather in agriculture which can cause widespread losses affecting a large number of producers, and on the desire to offset undesirable market outcomes, such as low income for some groups, despite the economic inefficiencies that may result.

III Private Sector Approaches to Agricultural Risk Management

There are many private sector approaches to managing risk in agriculture, including diversifying the enterprise, integrating vertically, engaging in production and marketing contracts, joining cooperatives, hedging in futures markets and futures options contracts, maintaining financial reserves, and working off the farm. Federal programs that help producers manage risks can sometimes complement these private sector approaches, but they may also discourage their use, or even displace them.

Deciding what and how to produce can help producers avoid or limit risk. For example, diversification means producing a mix of commodities so that low prices or yields for one commodity may be offset by higher prices or yields for a different commodity in that year. Over 50 percent of all farms in the United States produce more than one commodity in a year, with over 20 percent of farms producing three or more commodities. Smaller and nonfamily farms tend to have the least diversified agricultural enterprises. Choosing crops resilient to drought in dry years, managing irrigation water, reducing energy use, and employing new technology are additional ways producers may be able to reduce exposure to risk.

Vertical integration can be an effective risk management tool. Combining two or more successive production stages may provide better overall management of the production process, reduce overhead, improve efficiency, and result in outputs better tailored to meet the specific characteristics desired by consumers. Vertical integration, common in poultry and pork production, has not been common in grains and oilseeds, although farmer cooperatives have helped spur an increase in biofuels production and have been a mainstay in the collection and processing of milk.

Production and marketing contracts enable producers to mitigate risk. Contracts are agreements between producers and buyers before the harvest of a crop or the completion of a livestock production stage. Under a production contract, the producer's payment is based on the costs of producer-provided inputs, the quantity of production, or both, and may include a fee paid for the specific services provided. Under a marketing contract, the focus is on the commodity as it is delivered to the contractor, rather than on the services provided, and usually specifies a price and an amount to be delivered, but not how to produce the product. Producers usually bear all yield risk and frequently all input price risk.

From 1991 to 2003, the percentage of farms that used contracts as a risk management tool remained stable at about 10 percent; however, the value of agricultural production covered by contracts increased from 28 percent to 39 percent. For farms that used contracts, those contracts covered 20 percent of production on small farms and just over half of all production on farms with $500,000 or more in sales.

Hedging uses futures or options contracts traded on an exchange to reduce the risk of adverse price changes prior to an anticipated cash sale or purchase of a commodity. Hedging allows a producer to diversify the farm operation without actually changing the mix of agricultural products on the farm. A futures contract is an agreement priced and entered into at a point in time to trade a commodity at some time in the future. Because hedging focuses only on price in a certain market, hedging can reduce, but not completely eliminate, price risk. With options, the holder buys the right, but not the obligation, to take a futures position at a specified price before a specified date. Options provide protection against adverse price movements, while allowing the option holder to gain from favorable movements in the cash price. In this sense, options provide protection against unfavorable events similar to that provided by insurance policies.

Financial reserves can be used to smooth year-to-year fluctuations in income. In 2004, the median net worth of farm operator households was $460,000, a 35-percent increase from 2001. In comparison, median nonfarm household and self-employed nonfarm household net worth were $93,100 and $336,000, respectively, in 2004. While the data show that farm households, on average, hold more financial reserves than the rest of the public, almost 80 percent of farm household assets in 2004 could be attributed to farmland, buildings and equipment, and the operator's dwelling. These types of assets are far more difficult to use to smooth out annual changes in income compared to more liquid assets such as cash reserves, savings accounts, and stocks and bonds, but they can be used to provide collateral for loans.

Working off the farm is very common among farm households, especially small farms. Off-farm earnings can supplement farm earnings and thereby reduce the income variability for farm households. Across all farm operator households, only about 10 percent of household income was from farm sources in 2004, while 90 percent was from off-farm sources. For large farms (sales of $250,000 to $500,000), about 60 percent of total household income was from farm earnings, and 80 percent was from farm earnings for very large farms (at least $500,000 in sales). The ability to work off the farm depends on the amount of time available to work off farm and the number of off-farm opportunities. Farm enterprises which are management intensive, such as dairy and hogs, reduce farmers' ability to manage risk by working off the farm, although other household members may be able to do so. Off-farm employment can also reduce health care cost risks by providing affordable health insurance for farm families.

IV Federal Government Approaches to Agricultural Risk Management

A. Farm Program Overview

This section focuses on key Federal programs that help reduce farmers' price, production, and income risks. Government benefits to producers made under the Agricultural Act of 1949, as amended by the Farm Security and Rural Investment Act of 2002 (2002 Farm Bill), include payments for commodity programs, largely direct payments, counter-cyclical payments, and marketing assistance loan benefits, and payments for conservation programs, such as the Conservation Reserve Program, Environmental Quality Incentives Program, and the Conservation Security Program. Crop insurance is made available under the Federal Crop Insurance Act, as amended by the Agricultural Risk Protection Act of 2000. In addition, ad hoc disaster and market loss assistance has been authorized by Congress in a series of laws for most years since 1988.

Commodity price and income support programs authorized by the 2002 Farm Bill and funded through the Commodity Credit Corporation (CCC) cover feed grains (corn, sorghum, barley, and oats), wheat, oilseeds (soybeans, sunflower seed, canola, flaxseed, mustard, rapeseed, safflower, crambe, and sesame), upland cotton, rice, and peanuts. Under the 2002 Farm Bill, participating farmers

with base acres of these commodities are eligible for direct and counter-cyclical payments. In addition, these commodities and a number of other crops (including pulses, extra-long staple (ELS) cotton, honey, and wool and mohair) have marketing assistance loan programs. Ad hoc disaster programs, when authorized, cover nearly all major crops, including horticulture, livestock, aquaculture, and trees. Programs that support market prices by restricting marketable supplies are authorized for milk and sugar, and depending on the level of milk prices, milk producers are also eligible for payments.

Many of the commodity programs described above have been in effect, in one form or another, since the 1930s. In a more global market environment, programs are changing in several ways. Within the past decade, farm-sector benefits from payments that do not distort production and trade have increased, mainly through initiation of decoupled, production flexibility contract (PFC) payments under the 1996 Farm Bill and direct payments and counter-cyclical payments under the 2002 Farm Bill. Planting flexibility has allowed production decisions to better reflect market factors. Marketing loan provisions have worked to ensure that loan rates do not act as price floors and the government does not own large surplus stocks. In addition, two past program structures that relied upon supply controls and market price supports have been eliminated (tobacco) or restructured (peanuts).

Direct Payments. The quantity of a crop eligible for a direct payment is 85 percent of the crop's base acreage (a producer's historical acreage) *times* the direct payment yield per acre (a historical yield). The direct payment for each commodity is the direct payment quantity *times* the direct payment rate, which is set by the 2002 Farm Bill for the 2002-07 crops. Because they are based on a fixed quantity and payment rate, direct payments are decoupled from production and are considered minimally production and trade distorting. Producers are free to plant most crops on base acreage, with some limitations on planting fruits, vegetables and wild rice, or can elect to leave base acres idle and still receive direct payments.

Counter-Cyclical Payments. The quantity of a crop eligible for a counter-cyclical payment is 85 percent of the crop's base acreage times the counter-cyclical payment yield (a historical yield) times the counter-cyclical payment rate. The counter-cyclical payment rate is based on a statutory target price for each commodity, and the counter-cyclical payment rate increases when the commodity's season-average farm price falls, reaching a maximum when the farm price is at or below, the commodity's statutory loan rate. Since payments are based on historical acreage and yields, these payments do not depend on current production, and as such, are less distorting than payments tied to actual production. As with direct payments, producers are free to plant most crops on base acres or leave base acres idle and still receive counter-cyclical payments.

Marketing Assistance Loans. Farmers are eligible for marketing assistance loans when they harvest the eligible commodities. To participate, farmers decide how much of their current year's production they want a loan on and pledge that amount as collateral. Marketing assistance loans have a 9-month maturity and accrue interest. These loans are "non-recourse loans," meaning that the Government must accept the collateral as full payment of the loan at loan maturity if a producer so chooses. Because marketing assistance loan benefits depend on current market prices and current production, marketing assistance loans are considered be the most production and trade distorting forms of domestic support.

Producers can receive benefits from marketing assistance loans in four ways. First, a producer may repay a marketing assistance loan anytime before loan maturity at the alternative loan repayment rate announced by USDA, if the alternative repayment rate is less than the loan rate plus accrued interest (marketing loan gain). Second, a producer may elect to forego taking out a loan and receive the difference between the loan rate and alternative loan repayment rate (loan deficiency payment). Third, the producer may take out a loan, turn the collateral over to the CCC, purchase commodity certificates from the CCC, and use the certificates to purchase the commodity at the alternative repayment rate (certificate gain). Fourth, the producer may settle the loan by forfeiting the commodity to the CCC (forfeiture gain). ELS cotton is eligible for only the fourth type of benefit.

Programs that Support Market Prices—Sugar and Milk. The sugar and dairy programs support producers chiefly through restricting marketable supplies to consumers. The prices of raw cane and refined beet sugar are

supported through nonrecourse loans to processors. If the market price for raw cane or refined sugar falls below the price support level, processors may settle the loan by forfeiting the sugar placed under loan to the CCC. The 2002 Farm Bill authorizes domestic marketing allotments for sugar, unless imports of sugar exceed 1.532 million tons, and such imports are not needed to fulfill a shortfall in U.S. production. When established, marketing allotments restrict the amount of raw cane and refined beet sugar that may be marketed by sugar processors. In addition, sugar imports are subject to a tariff rate quota, which restricts the amount of sugar that can be imported into the United States at a low tariff, to prevent the price support program from supporting the world price of sugar.

During FY 2002-05, the sugar price support program has operated at no net cost to the Government, as restrictions on domestic marketings and imports along with hurricane-related production losses have allowed the CCC to sell-back any forfeitures of sugar in prior years. However, under the North American Free Trade Agreement (NAFTA), the import tariff on Mexican sugar falls to 1.5 cents per pound on January 1, 2007, and to zero on January 1, 2008. The decline in the import tariff on Mexican sugar could push imports above 1.532 million tons and prevent implementation of marketing allotments. Under this scenario, substantial forfeitures of price support loans could occur, leading to a sharp increase in the cost of the sugar price support program.

The price of milk is supported through CCC purchases of butter, cheese, and nonfat dry milk. During 2002 and 2003, higher milk production led to a sharp increase in CCC purchases of nonfat dry milk. On October 1, 2003, the CCC held over 1.4 billion pounds of nonfat dry milk in storage. In 2004 and 2005, purchases declined sharply as milk prices rebounded and CCC inventories of nonfat dry milk were liquidated through domestic and international donation programs, including assistance to livestock producers affected by drought.

A new direct payment program for milk, the Milk Income Loss Contract (MILC) program, was authorized by the 2002 Farm Bill through September 30, 2005. Under the program, producers are eligible for monthly payments if the price of fluid milk for beverage use falls below an established level. Payments are made to a producer on the amount of milk marketed not to exceed 2.4 million pounds in a fiscal year. The Agricultural Reconciliation Act of 2005 extended the MILC program through August 31, 2007, but lowered the payment rate. Under the MILC Program, $2 billion has been paid to dairy producers.

The Agricultural Marketing Agreement Act of 1937 authorizes the establishment of marketing agreements and orders for a wide range of commodities. Under this legislation, Federal marketing orders have been established for milk. Federal milk marketing orders provide for the establishment of minimum prices of raw milk according to use and the pooling of receipts across all the uses of raw milk. Within a Federal milk marketing order, producers receive a blend price for milk reflecting the weighted-average price for the various end uses for milk marketed within the boundaries of a Federal order. Generally, farm bills have not addressed Federal milk marketing orders. However, the 1996 Farm Bill mandated that the Secretary of Agriculture reform and consolidate Federal milk marketing orders and the 1985 Farm Bill addressed minimum Class I differentials.

Payment limits. Under the 2002 Farm Bill, direct payments are subject to a $40,000 per person payment limitation and counter-cyclical payments are subject to a separate $65,000 limit. Loan deficiency payments and marketing assistance loan gains under the marketing assistance loan program are limited to $75,000 per person, while forfeiture gains and certificate gains are not limited. In addition, an individual or entity whose average adjusted gross income for the three preceding years exceeds $2.5 million is ineligible for direct, counter-cyclical, and loan deficiency payments; marketing assistance loan gains; and payments under any conservation program, unless at least 75 percent of the average adjusted gross income is derived from farming, ranching, or forestry operations.

Payment limits apply to "persons," that is each "person" has a separate payment limit. A person may be an individual (human being) or it may be an entity used by a producer as a way to organize the farm business, such as a corporation. The 2002 Farm Bill continued the 3-entity rule. Under this rule, a person who receives payments as an individual can also receive payments through two additional entities in which the individual has up to a 50 percent ownership share in each, effectively doubling the payment limit.

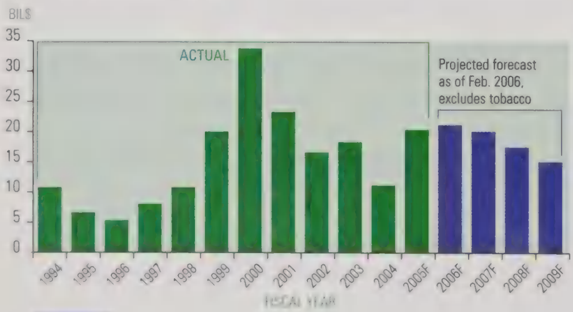
B. Distribution of Payments Under Farm Programs

This section examines the overall outlays on farm programs and the distribution of farm program payments, answering the question of "to whom" and "where" government payments to producers go and the level of support the payments provide. First, data on commodity program payments made in total, by type, and by crop are examined. Then, payments received by farms and farm households are addressed, which allows payments to be compared to income and other characteristics of the farm and the farm household. These farm household data are only available on a calendar-year basis.

Commodity Credit Corporation Expenditures. Commodity programs are administered through the CCC. CCC outlays include commodity price and income support program payments, expenses incurred under several of USDA's trade and conservation programs, and outlays for ad hoc and emergency assistance. Crop insurance is not included in CCC outlays.

Total CCC outlays peaked in fiscal year (FY) 2000 at $32.6 billion as declining market prices for major crops caused Congress to supplement production flexibility contract payments authorized under the 1996 Farm Bill with economic loss assistance payments (Figure 1). By FY 2004, CCC outlays dropped to $10.6 billion as prices for major crops recovered, but prices then reversed and outlays nearly doubled to over $20 billion in FY 2005. CCC outlays are forecast to remain above $20 billion in FY 2006 and FY 2007, as large production has continued to pressure prices for major crops, increasing counter-cyclical payments and marketing loan benefits.

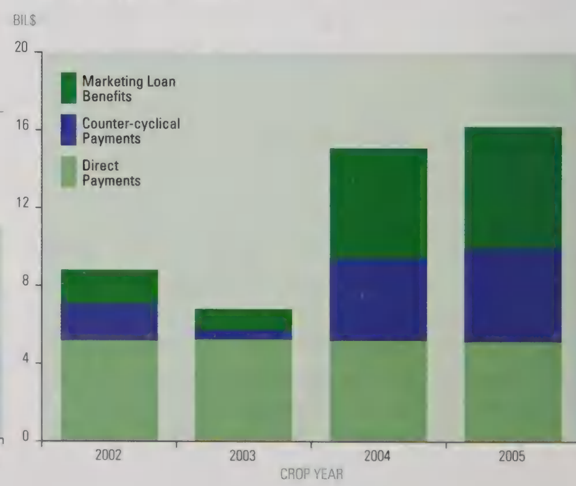
FIGURE 1. Commodity Credit Corporation Net Outlays, FY 1994 - 2009 Forecast



Following enactment of the 2002 Farm Bill, the Congressional Budget Office (CBO) projected spending under the 2002 Farm Bill. During FY 2002-04, actual spending under the 2002 Farm Bill, including ad hoc and emergency assistance, was well below CBO's forecast. However, actual spending moved above CBO's forecast in FY 2005, and annual spending is projected through the end of the 2002 Farm Bill to remain $1-2 billion above CBO's forecast made at the time the 2002 Farm Bill was enacted.

Total Payments by Type of Payment. For the 2002-05 crop years, commodity program payments, defined as direct payments, counter-cyclical payments, and marketing assistance loan benefits, are estimated to average $11.7 billion per year (Figure 2). Total payments fell from $8.8 billion for the 2002 crops to $6.7 billion for the 2003 crops as crop prices strengthened, but payments are forecast to increase to $16 billion for the 2005 crops as crop prices have generally declined in the face of record or near-record large crop production. Direct payments have been constant at about $5.3 billion per year. Counter-cyclical payments have ranged from a low of about $0.5 billion for the 2003 crop year to nearly $5 billion expected for the 2005 crop year. Marketing loan benefits have ranged from less than $1 billion for the 2003 crop year to over $6 billion expected for the 2005 crop year.

FIGURE 2. Commodity Program Payments, 2002 - 2005 Crop Years



Payments by Crop. Of total commodity program payments during 2002-05, 93 percent are estimated to go to wheat, rice, corn, soybean, and upland cotton producers. These 5 crops accounted for an estimated 21 percent of total farm cash receipts in 2005. Commodity program payments to corn producers are estimated to average $5.4 billion per year and account for 46 percent of total payments made for the 2002-05 crops (Figure 3). Over this period, 23 percent of payments went to upland cotton producers; soybean, wheat, and rice producers each received 6-10 percent of the total. Other feed grain, other oilseed, and peanut producers combined received about 7 percent.

FIGURE 3. **Distribution of Payments, 2002 - 2005 Crops, Percent Share**

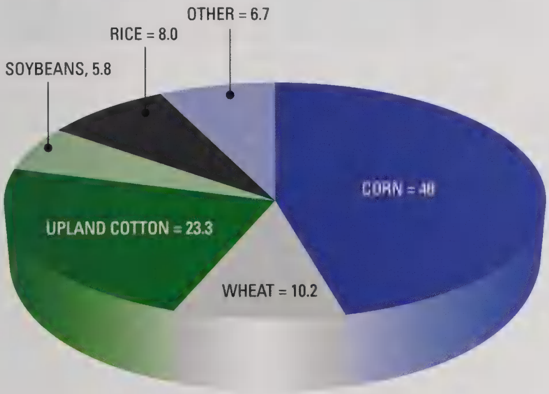
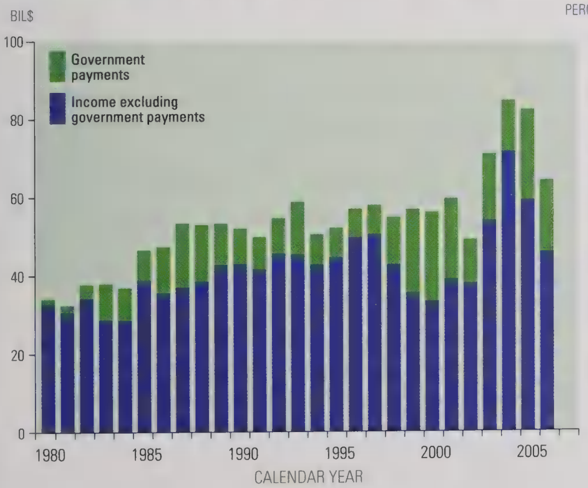


FIGURE 4. **U.S. Net Cash Farm Income, 1980 - 2006**

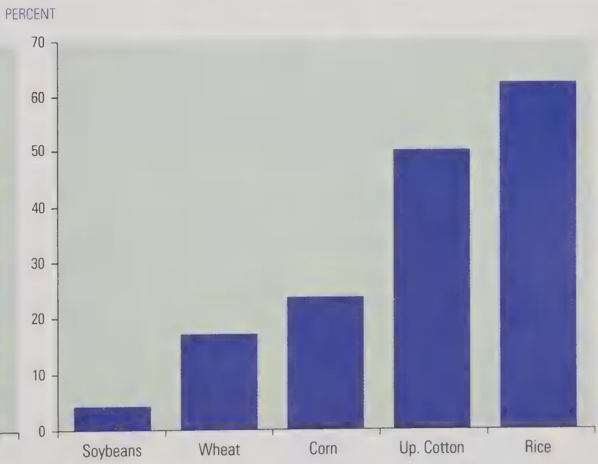


Payments in Relation to U.S. Net Farm Income. During calendar years 2002-2005, government payments to farmers and ranchers for commodity programs, conservation programs, and emergency assistance averaged $16.2 billion per year, but declining market prices and increased emergency assistance authorized by Congress in the form of ad hoc disaster payments caused farm program payments to reach a record $23.0 billion in calendar year 2005 (Figure 4). Compared with the late 1990s, commodity payments have declined as a percentage of U.S. net cash farm income, primarily because livestock sector returns have increased sharply.

Payments in Relation to Crop Production Value. In addition to varying in dollar terms by crop, payments vary substantially as a share of the market value of production (Figure 5). Measuring support in terms of market value for the 5 major crops that account for most payments, support ranged from a low of an estimated 4 percent for soybeans, to 17 percent for wheat, 23 percent for corn, 50 percent for cotton, and a high of 63 percent for rice over the 2002-2005 crop years.

Farms Receiving Government Payments. The 2004 Agricultural Resource Management Survey (ARMS) provides calendar-year information on the role of government payments (including commodity program, conservation, and disaster payments) from the perspective of the farm

FIGURE 5. **Farm Program Payments as a Share of Production Value, 2002 - 2005 Crop Years**



Payments = marketing loan benefits and direct and counter-cyclical payments

business and the farm operator household. ARMS data indicate that 39 percent of all farms received government payments in 2004 (see Appendix Table 1). For farms that received a payment, the average payment per farm was $12,517. Among farms receiving payments, this payment represented an average of 7.4 percent of the farm's gross cash income or 26 percent of the farm's net cash income.

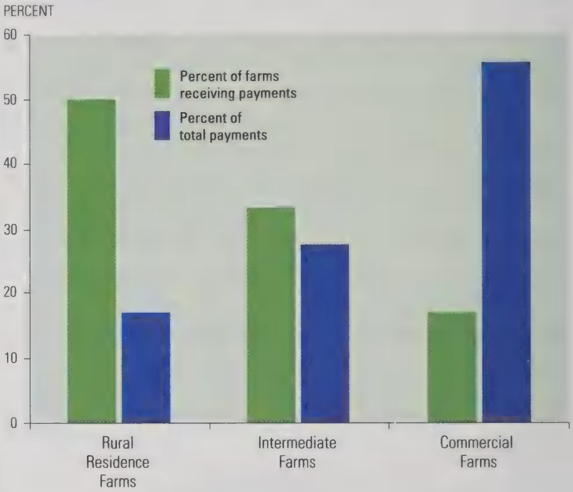
Gross cash income of farms receiving government payments averaged $170,166 in 2004, more than three times that of farms not receiving government payments. Direct payments comprised over one-third of total government payments, and more farms received direct payments than other program payments.

A farm's commodity specialization is determined by the one commodity or group of commodities that makes up at least 50 percent of the farm's total value of production. Using this definition, about half of all U.S. farms can be classified as a particular type. Farms specializing in ***rice*** received an average of $53,660 in 2004, the highest for any commodity farm type. The next highest payments per farm were reported by ***cotton*** farms, which averaged $49,327. ***Cash grain and soybean*** farms averaged $19,008 per farm, but these farms accounted for 53 percent of payments made. More farms—35 percent of all farms—are classified as ***beef cattle*** farms than for other categories. These farms, which represent 23 percent of farms receiving payments, received $6,687 per farm, or 12 percent of all payments. ***Dairy*** farms averaged $10,417 and accounted for 5 percent of payments made. Livestock farms receive support because they produce crops that are eligible for payments.

Distribution by Farm Typology. One typology often used with ARMS data groups farms into three categories: ***commercial farms,*** farms with sales of $250,000 or more and the farm operator reports farming as the major occupation (less than 10 percent of all farms); ***intermediate farms***, farms with sales under $250,000 and the farm operator reports farming as the major occupation (25 percent of all farms); and ***rural residence farms***, farms in which the farm operator's major occupation is not farming or the farm is a limited-resource farm (65 percent of all farms).

A much higher share of commercial farms, 69 percent, received payments relative to other types of farms. Fifty-one percent of intermediate farms and only 30 percent of rural residence farms received government payments. Commercial farms accounted for nearly 17 percent of the farms receiving government payments, but received 50 percent of total government payments, reflecting the fact that payments are based on the level of current and historical production (Figure 6).

FIGURE 6. Farms Receiving Government Payments and Payments Received by Farm Typology, 2004

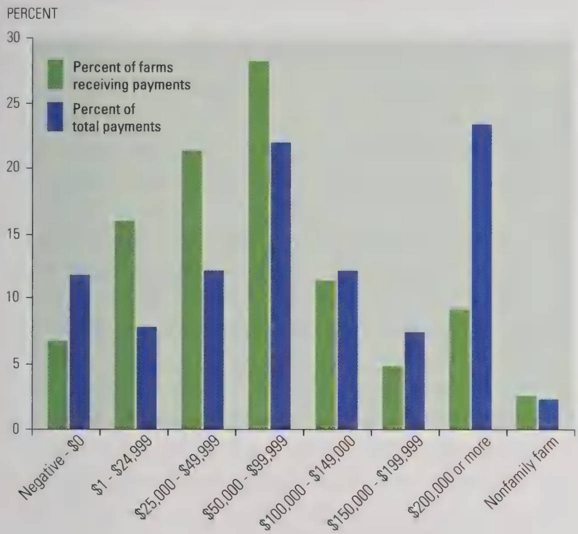


Because there are so many more rural residence farms, they accounted for most of the farms receiving payments. They accounted for 56 percent of the farms receiving payments but only 17 percent of total payments. However, rural residence farms accounted for 58 percent of conservation program payments (Conservation Reserve Program, Wetlands Reserve Program and Environmental Quality Improvement Program).

Although most of the payments went to larger operations, government program payments contributed a larger share of gross cash income for smaller farms. The average payment for rural residence farms was $4,266, which was 15 percent of gross cash income. The average payment for commercial farms was $40,453, nearly 6 percent of gross cash income.

Distribution by Farm and Operator Household Income. Farm households with household incomes of $200,000 or more, over 7 percent of all farm households, received 23 percent of all government payments in 2004 (Figure 7). About 84 percent of their payments were direct, counter-cyclical, and loan deficiency payments. Nearly

FIGURE 7. Farms Receiving Government Payments and Payments Received by Household Income, 2004



one-third of all farms receiving government payments had household incomes of $50,000-$99,999. About 44 percent of all farm households receiving payments had incomes of less than $50,000 and received 32 percent of all farm payments. Over 12 percent of farms receiving payments had net cash farm incomes over $100,000 and received 42 percent of payments. About 55 percent of farms receiving payments had net cash farm incomes below $10,000 and received 26 percent of the payments.

C. Crop Insurance and Ad Hoc Disaster Assistance

Under the Federal crop insurance program, insurance companies approved by the Risk Management Agency (RMA) market and manage the delivery of crop insurance policies to producers. The Federal Government provides reinsurance and administrative and operating expense reimbursement to the companies and premium subsidies to producers. Crop insurance provides coverage for a loss in yield or a loss in revenue (yield and price) for over 350 commodities in all 50 States and Puerto Rico. In addition to addressing yield and revenue risks, there are whole-farm gross revenue insurance policies available in some States.

The Federal Crop Insurance Act was amended by the Agricultural Risk Protection Act of 2000 (ARPA) to increase participation in crop insurance through expanded crop and livestock coverage and increased subsidies. For the 2005 crop year, there were 1.2 million Federal crop insurance policies in force covering 246 million acres with a liability of $44.3 billion. Acres covered in 2005 were up 20 percent from 2000, the year prior to implementation of ARPA, and liability was up 30 percent from 2000. About one-third of insured crop value is covered by a basic catastrophic policy whose premium is completely subsidized by the Federal Government. More comprehensive 'buy-up' policies cover the remaining two-thirds of the insured crop value at an average coverage level of 70 percent (or a 30-percent deductible). The Federal Government subsidizes an average of 57 percent of the producers' premium. Since ARPA, buy-up coverage of 70 percent or above has increased sharply, rising from 22 percent of insured crop acreage in 2000 to 57 percent in 2005 (excluding area yield and revenue plans of insurance). About 60 percent of crop insurance coverage provides revenue protection, the fastest growing plan of insurance in recent years.

Crop insurance policies were in place on about two-thirds of total U.S. crop value and 85 percent of the value of the major crops covered by commodity programs during 2004 (Table 1). However, because policies have a deductible portion, liability is equal to 39 percent of total U.S. crop value and 57 percent for the major crops covered by commodity programs. Seven crops accounted for 80 percent of the total crop insurance liability in 2005,

TABLE 1. Participation in the Federal Crop Insurance Program for Major Crops, 2004

Crop	Percent of Crop Value Insured	Liability as a Percent of Crop Value
Barley	63	42
Corn	92	64
Cotton	99	61
Sorghum	99	65
Peanuts	78	46
Potatoes	70	34
Rice	58	25
Soybeans	80	56
Sugar Beets	90	58
Sugarcane	71	23
Tobacco	73	50
Wheat	82	54
Average	85	57

although participation in a range of specialty crops is growing. Two crops, corn and soybeans, accounted for just over half of total insured liability. The Grain Belt States of the Midwest, plus California and Florida, account for half of insured liability. Under ARPA, a pilot program for price insurance for cattle and hogs was created, with livestock insurance costs limited to $20 million per year. Participation has been low to date.

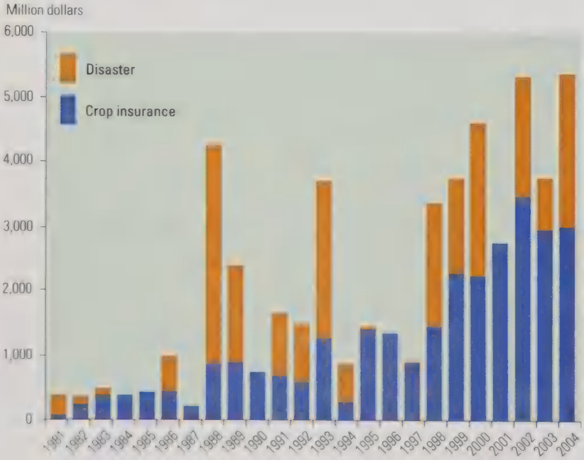
The total cost to the Government of the Federal crop insurance program averaged $3.1 billion for 2002-2005. Premium subsidies account for about three-fourths of the total cost. Compensation to private crop insurance companies accounts for the remaining one-fourth of the program cost. Program costs have increased as subsidies were raised through legislated program reforms in 1994 and 2000 to increase participation and buy-up coverage.

TABLE 2. Premium, Indemnity, and Loss Ratio for the Federal Crop Insurance Program, 1994-2005

Year	Premium ($ Millions)	Indemnity ($ Millions)	Loss Ratio (Indemnity/Premium)	Government Cost of Program ($ Millions)
1994	949.4	601.1	0.63	367
1995	1,543.3	1,567.7	1.02	1,523
1996	1,838.6	1,492.7	0.81	1,430
1997	1,775.4	993.6	0.56	971
1998	1,875.9	1,677.5	0.89	1,590
1999	2,310.1	2,434.7	1.05	2,318
2000	2,540.2	2,594.8	1.02	2,268
2001	2,961.8	2,960.1	1.00	2,777
2002	2,915.9	4,066.7	1.39	3,529
2003	3,431.2	3,257.7	0.95	3,098
2004	4,185.4	3,205.0	0.77	3,162
2005 1/	3,947.8	2,334.0	0.59	2,640

1/ Indemnity, loss ratio, and cost are projected.

FIGURE 8. Crop Insurance Indemnity & Delivery Costs and Disaster Assistance



The actuarial performance of Federal crop insurance has steadily improved over the years (Table 2). During 1981-1990, the loss ratio, which is total indemnities divided by total premiums (including premium subsidies), averaged 1.53. During 1991-2000, the loss ratio declined to an average of 1.07. And during 2001-2005, the estimated loss ratio has averaged an even lower 0.93. Actuarial performance has improved due to the continuing assessment of historical experience and adjustment of premium rates by RMA to better cover expected losses, increases in participation and buy-up coverage, and increased purchases of revenue policies.

Despite the increase in participation and purchase of buyup coverage levels since the mid-1990s, Congress has continued to provide ad hoc disaster assistance to producers (Figure 8). Since 1998 over $14 billion has been provided in disaster assistance to livestock and crop producers. Factors used to explain Congressional action on disaster assistance include: low participation or coverage levels in some areas; unavailability of insurance for some commodities; limited coverage for livestock, pasture, and rangeland; and deductibles that are perceived by some as too large.

D. Conservation

Natural resource conservation and environmental protection will be examined in a subsequent theme paper. The theme is discussed here because there are a range of conservation activities that farmers, ranchers, and communities may undertake to reduce their risks. Under USDA conservation programs, production and yield risks may be reduced by financial assistance, technical assistance, and stewardship programs. Many of the conservation-related approaches to risk management are particularly effective because they not only reduce risks to producers but they also reduce the future costs of Federal risk mitigation. For example, grazing land that is well managed and is productive under good conditions enables ranchers to sustain production during short-term droughts and recover more quickly from severe droughts. In addition, conservation programs address environmental risks beyond the producer by helping to improve water quality, air quality, and wildlife habitat.

Risks from floods, drought, and invasive species, for example, are directly addressed through cost share, incentive payments, easement purchases, stewardship payments, rental payments, and technical assistance provided by USDA's Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA) (Table 3). One NRCS program, the Snow Survey program, plays a major role in addressing the water supply risks in the West. Price and market risk are also addressed by financial and technical assistance and stewardship programs through payments which affect income support directly and through the potential for decreased input costs due to adoption of improved management practices. Institutional risk is addressed through programs that reduce the cost of complying with existing State and Federal regulations. In addition, the risks of having to comply with future regulations are reduced through voluntary installation of conservation measures. Financial risk is also reduced due to direct capital investment in farm infrastructure and payments to program participants.

Environmentally vulnerable lands often are more susceptible to production risks, such as drought. The Conservation Reserve Program (CRP), administered by FSA, compensates landowners with annual rental payments when they agree to place environmentally vulnerable cropland into conservation covers such as grass, trees, and wetlands. CRP payments are guaranteed in 10- to 15-year contracts assuring landowners a revenue stream from their cropland. CRP can thus be used by landowners to reduce exposure to production risk on marginal cropland, helping maintain financial risk on farms at an acceptable level. In addition, voluntary conservation under CRP, as do all USDA conservation programs, reduces the risk of unanticipated expenditures from future environmental regulations.

TABLE 3. USDA Conservation Program Funding ($ Millions)

Type of Program	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Technical Assistance 1/	1,068.3	1,243.2	1,370.0	1,432.1	1,364.9
Financial Assistance 2/	493.6	631.0	987.3	1,362.5	1,358.2
Easements 3/	345.7	394.7	420.5	421.2	330.0
Stewardship Contracts 4/	0	0	35.2	172.0	220.2
Rental Contracts 5/	1,777.4	1,783.6	1,822.8	1,833.6	1,899.5
Total	**3,685.0**	**4,052.4**	**4,635.4**	**5,221.5**	**5,172.6**

1/ Includes Conservation Technical Assistance, SoilSurvey, Snow Survey, Plant Materials Center, Resource Conservation and Development, and technical assistance for the CCC funded Farm Bill conservation programs, Emergency Watershed Program, and Watershed Surveys and Planning Programs.

2/ Includes financial assistance for the Wildlife Habitat Incentives Program, Environmental Quality Incentives Program (EQIP), EQIP-Klamath Basin, EQIP-Ground and Surface Water Conservation, Agricultural Management Assistance, Forestry Incentives Program, Watershed Rehabilitation, Emergency Watershed Program, Flood Prevention Operations, EQIP FY-2002 educational assistance, and Watershed Operations programs.

3/ Includes easement payments for the Grassland Reserve Program (estimated at 40 percent of Grassland Reserve Program financial assistance), Wetland Reserve Program, Farm and Ranch Lands Protection Program, and Healthy Forests Reserve Program.

4/ Includes all payments associated with the Conservation Security Program.

5/ Includes all payments from the Conservation Reserve Program and the rental payments from the Grassland Reserve Program (estimated at 60 percent of the Grassland Reserve Program financial assistance).

V Economic and Policy Issues for Federal Agricultural Risk Management Programs

This section provides a general assessment of the support provided by current programs using several evaluation criteria: reduction of income risk, the level and comprehensiveness of benefits, resource and structural effects, program cost, and implications for U.S. commitments under the World Trade Organization (WTO). Conservation programs will be addressed in a future theme paper.

Income Risk Reduction. The program descriptions and data presented to this point indicate that current price and income support, crop insurance, disaster, and conservation programs comprise substantial resources directed at income risk reduction for U.S. agriculture, particularly for the principal program crops (food grains, feed grains, upland cotton, and soybeans) and sugar and dairy. The regular provision of ad hoc disaster assistance has reduced risks even further, but assistance is highly variable in terms of available dollars. Nonprogram crops and livestock are only eligible for ad hoc disaster and conservation programs and limited insurance programs. The risk reduction capacity of crop insurance and conservation has expanded sharply under ARPA and the 2002 Farm Bill, respectively. Conservation financial assistance remains small compared with the other support mechanisms but has the benefit of reducing future Federal and private risk management costs.

Corn can be used as an example for discussing the income risk reduction of current programs. During the 2002 and 2003 crop years, the price received by producers for corn averaged $2.37 per bushel, about equal to the average of the 1990s, and corn program payments (direct and counter-cyclical and marketing loan benefits) averaged $2.2 billion. For the 2004 and 2005 crop years, the corn price is estimated to average only $2.03 per bushel, 14 per-

cent below 2002-2003. Corn program payments for 2004-2005 are estimated to be up 290 percent, to an average of $8.6 billion. In addition to corn program payments, corn producers received an estimated average of about $550 million in crop insurance indemnities during 2004-2005, compared with $1 billion averaged during 2002-2003. In the aggregate, both gross and net income from corn production, including government payments, increased during 2004-2005, compared with 2002-2003, despite the sharp decline in market prices.

Farm program payments provide producers with substantial protection in the event of price and yield shortfalls. However, the sharp increase in payments and income relative to the drop in price suggest that government price and income support programs may be a blunt mechanism to reduce income variability or risk. The basic reason is that stabilizing price or yield alone may do little to stabilize revenue. In the absence of government price intervention, when aggregate yield falls, prices rise, and vice versa. This correlation provides a moderating "natural hedge" against the revenue shortfalls that might otherwise result from yield shortfalls. Thus, the following effects of payments can be observed:

- ***First,*** direct payments are fixed and therefore do not offset variability. They solely provide income enhancement, which may be used to offset business risks.
- ***Second,*** while counter-cyclical payments are negatively correlated with price, they ignore production effects and can thus negate the risk-reducing aspect of the natural hedge. For example, large yield increases can reduce prices, triggering a counter-cyclical payment but the higher yields also help offset the effect of lower prices on income. Because counter-cyclical payments do not take the increased income effect of higher yields into account, while mitigating income risk, they can more than compensate for a revenue decline and even add to income variability. Conversely, in the event of a crop loss, prices may rise thus reducing the counter-cyclical payment. Lastly, because counter-cyclical payments are made on historical production, like direct payments, their role may be more income enhancement than stabilization.
- ***Third,*** marketing loan benefits, while triggered by low prices, are based on a loan rate relative to a local spot market price, not the price the producer actually receives from the sale of the product. A producer can sell at the market price that is used to lock in the loan benefit, or lock in the benefit at a time of weak prices and sell later at a higher price. Thus, the loan program may overcompensate for a drop in market prices. In addition, loan benefits are based on current production. A producer who has a crop loss would not receive the loan benefit on lost production, in which case, the loan program fails to reduce income risk. Moreover, a large national crop loss that results in a higher market price may greatly reduce a producer's production eligible for loan benefits and may also reduce the counter-cyclical payment. In this case, a producer who loses a crop receives no marketing loan benefits or counter-cyclical payments.

Crop insurance has seen large increases in participation and buyup coverage and sound actuarial performance in recent years. However, crop insurance has a number of issues. Subsidies are rising and disaster assistance continues to be regularly provided. Crop insurance is in place for 66 percent of total U.S. crop value but the liability of those policies is only equal to 39 percent of total U.S. crop value. With an average premium subsidy of nearly 60 percent, further increases in premium subsidies to address the coverage deficiency are likely to increase participation and coverage levels only modestly, with a large increase in total program costs for each additional acre insured. While livestock price insurance has been initiated on a pilot basis, questions remain as to whether such insurance displaces the sale of available futures and options contracts or discourages private sector development of alternative tools. Whole farm revenue insurance has been offered in recent years, but participation remains low. The policy is complex to sell and administer. Coverage for some specialty crops and livestock forage remains limited.

Level and Comprehensiveness of Support.

Government payments are not distributed evenly across the country or by size or type of farm. This fact raises questions about the equity of program benefits. Payments under the price and income support programs are heavily concentrated in the central and southern parts of the United States, reflecting production of program crops, with a large proportion of the payments going to the largest farms with the highest net farm incomes (Appendix

Figures). Crop insurance premium subsidies are also more heavily concentrated in the central and southern parts of the United States, similar to the pattern of the price and income support programs. Conservation payments are somewhat more evenly distributed, reflecting acreage in farming and ranching.

The data presented earlier indicated 39 percent of farms received government payments in 2004, with a larger portion of commercial farms receiving payments than small farms. Commercial farms, the largest 10 percent of farms, received 56 percent of all payments. On average, commercial farms that received government payments received over $40,000 and had average net cash farm income of $217,000. In addition, payments are highly concentrated by commodity, with 93 percent of commodity program payments estimated to have gone to wheat, rice, corn, soybeans, and upland cotton producers during 2002-2005.

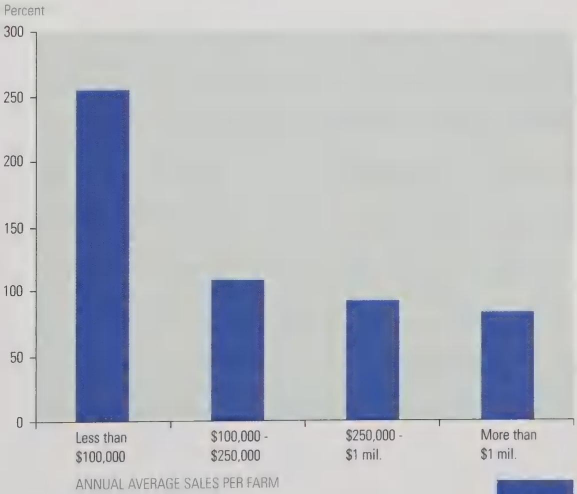
Resource and Structural Effects. Farm programs have become more market-oriented over time. Beginning in the 1980s, loan rates were reduced, payments were eliminated on a portion of base acres, annual acreage control programs were eliminated, counter-cyclical payments were based on fixed yields, and direct payments were based on fixed yields and fixed payment rates. Counter-cyclical and direct payments are generally thought to have minimal effects on production. As historical yield data were obtained, crop insurance premium rates were adjusted to better reflect loss history. Collectively, these changes reduced the effects of farm and insurance programs on resource decisions by producers.

Even so, today's programs contain elements that provide incentives for resource use that may be inconsistent with market signals. For example, the marketing assistance loan program assures a per unit return at least equal to the loan rate regardless of how low market prices fall. This return is assured on all current production. Thus, when market prices are near or below loan rates, the risk reduction and assured return of the loan program provide an incentive to plant more acreage and apply more inputs, such as fertilizer, and thus produce more than would be the case in the absence of the program. For example, studies conducted around the time of enactment of the 2002 Farm Bill concluded that the increase in loan rates under the 2002 Farm Bill would increase area planted to principal crops by about 2 million acres, or 1 percent. Studies of crop insurance have also indicated that premium subsidies and the risk reduction provided by the program have increased planted acreage, although the size of the effect is debatable.

The experience of dry peas and lentils indicates the potential effects of a marketing loan program. Under the 2002 Farm Bill and the Consolidated Appropriations Resolution (2003), Congress established loan and loan repayment rates for dry peas and lentils that created incentives for significant acreage expansion. For example, when using loan rates as the planting incentive for producers, expected returns above variable costs in 2005 for dry peas and lentils were well above wheat. Dry pea and lentil area has tripled in the last four years, from 0.4 million acres in 2001 to 1.3 million in 2005, and is expected to exceed 1.6 million this year. Statutory provisions require that loan repayment rates be based on lower valued product (feed or no. 3 grade), increasing marketing loan benefits that nullify market price signals.

Similarly, the sugar and dairy programs, during times of abundant U.S. and world supplies, provide incentives to produce more than otherwise by maintaining market prices above where they would be in the absence of the programs. To the extent that the supported prices for sugar and milk and dairy products exceed the market prices that would prevail in the absence of the programs, consumers of those products pay more, in effect transferring income to pro-

FIGURE 9. Ratio of Total Costs of Production to Total Revenues by Farm Size



ducers. In addition, payments under the MILC program are tied both to current production and prices, mitigating income risk but creating incentives to maintain production in the face of declining prices.

Another effect of commodity programs may be on the size of farming operations. While program payments may help some producers remain in business in the short term by augmenting income, program payments may provide a means for other producers to outbid competitors for farmland and expand their operations. The latter effect may follow from the economies of scale associated with large farms compared with small farms. Data indicate that, on average, large farms have a lower per unit cost of production than small farms and that the ratio of costs to revenues is much lower (Figure 10). Consequently, the expected net return per added acre for a large farm would exceed that for a small farm, causing the large farm to be able to pay more for additional acres. That would be true with or without commodity programs. To the extent that large farms have more capital to invest and as a result are more productive per acre, they may receive more program payments per acre, which could help finance their further expansion.

Another effect of commodity programs is their impact on farmland values. Farmland values depend on many factors, including income generated from the products produced on the land; other income, such as commodity program payments; the value of the land in nonagricultural uses; the presence of environmental amenities; and interest rates. Many studies have concluded that commodity payments are capitalized into farmland values with the effect dependent on the degree of competition for land, crop productivity, costs of production, size of payments, and the potential for nonagricultural uses. While varying by region, some studies suggest U.S. farmland values are 15-25 percent higher due to commodity programs. Increased farmland values and associated higher rents may accrue to individuals not involved in production, as 40 percent of farmland is rented. Higher farmland values have several effects: they benefit farm operators who own and invest in farmland; they may improve access to credit, making land purchases easier; they may deter new entrants from farming and constrain expansion by more limited resource farms; they increase costs of production; they increase investment in farmland by nonfarmers; and they may increase taxes to landowners.

Program Cost. Commodity program costs have increased sharply, expected to about double in FY 2006 compared with FY 2004. Costs are expected to remain well above the average of the 1990s. Government crop insurance costs have steadily increased under statutory increases in subsidy levels and increased participation, rising from about $1 billion per year in the mid 1990s to an expected level of $4.3 billion for the 2006 crop year. Ad hoc disaster assistance has been consistently provided in recent years with costs of nearly $3 billion in calendar 2005. Conservation program costs have increased from $3.7 billion in FY 2002 to an expected $5.2 billion in FY 2006. High costs are an issue in the current Federal budget environment where deficits are large and persistent. In addition, the dairy and sugar price support programs add to consumer costs and can result in stock accumulation by the Government which can be difficult and costly to manage.

The 2002 Farm Bill was developed under a budget that permitted spending to increase by about $8 billion per year above the levels projected under a continuation of the 1996 Farm Bill. If the 2007 Farm Bill is developed under a budget target that is below spending under a continuation of the 2002 Farm Bill, similar to the situations for the 1996 and 1990 Farm Bills, program costs will become even more of an issue as spending has to be reduced to meet the budget target. High costs also have an implication for WTO obligations, as discussed in the next section.

WTO Implications. Domestic farm support policies were recognized as one source of market and trade distortions when the Uruguay Round Agreement on Agriculture (URAA) was negotiated. Under the URAA, which went into effect in 1995, countries agreed to limit subsidies from domestic policies that were presumed to be the most trade distorting but were allowed to exempt other policies from any limitations. The different categories of domestic subsidies are commonly referred to as the "boxes"—amber box, blue box, and green box. The colors of the boxes represent the level of trade distortion.

Amber box policies are the most production and trade distorting and generally are payments based on prices or production and price support programs. Amber box policies are measured by the Aggregate Measurement of Support (AMS), which is a dollar value of the support provided each year, calculated using specific rules. The annual limit for the U.S. AMS is $19.1 billion.

Amber box policies are further classified into two groups: *commodity specific* or *non-commodity specific*. The main commodity-specific amber box policies are payments under the marketing loan programs (loan deficiency payments, marketing loan gains, and certificate gains) and the benefits of the price support programs for dairy and sugar. Commodity-specific amber box support is counted as part of the AMS only if it equals more than 5 percent of value of production for each commodity (e.g., wheat specific support must exceed 5 percent of the annual value of wheat production). Since 1995, commodity-specific amber box support, as measured by the AMS, has ranged from a low of $5.9 billion to a high of $16.9 billion. Dairy has accounted for about $5 billion annually and sugar another $1 billion. Marketing loan benefits have been highly variable because they are based on market prices which have fluctuated.

Non-commodity specific amber box support cannot be attributed to a specific commodity. Such support includes crop insurance; input subsidies, such as irrigation; and the Market Loss Assistance (MLA) payments made from 1998-2001 under ad hoc disaster assistance legislation.

As with commodity specific support, there is a *de minimis* rule for non-commodity-specific support. To be included in the AMS, total non-commodity-specific support must exceed 5 percent of the value of total U.S. agricultural output. The total non-commodity-specific support has been less than 5 percent of the total value of U.S. agricultural production, and to date, such support has not been notified to the WTO as part of the AMS. *De minimis* support has increased over time, reflecting the MLA payments and increased indemnities under crop insurance programs. Counter-cyclical payments have not been notified to date, but under current criteria would be considered nonproduct specific amber because payments are price-linked although decoupled from current production.

Blue box policies were originally envisioned as transition policies that would help pave the way for further reforms over time, and are exempt from the AMS reduction commitments. Blue box policies are program payments received under production limiting programs, and must be based on fixed area and yields, a fixed number of head of livestock, or made on 85 percent or less of a historical level of production. Deficiency payments (made prior to the 1996 farm bill) were notified as blue box, since payments met the specific requirements. The U.S. has not notified any blue box programs since the 1996 farm bill eliminated the deficiency payment program.

Green box policies are not subject to reduction commitments under the URAA because these policies are assumed to affect trade minimally. The main U.S. green box programs are USDA food assistance programs, the Conservation Reserve Program and other conservation programs, and most disaster payments. Direct payments under the 2002 Farm Act have not been notified but would be considered green box.

The United States has been under considerable international pressure to reform its domestic farm programs in the Doha negotiations. To that end, the United States put forward a WTO proposal in October 2005 that called for substantial cuts in trade-distorting domestic support. The United States proposed to cut its amber box limit by 60 percent over a 5-year period. The United States also proposed reducing allowed levels in the blue box and the *de minimis* categories from the 5-percent level (based on value of agricultural production) by half, to 2.5 percent of the value of production. Under a framework agreement reached in July 2004, WTO members agreed to a new blue box category, which would provide for programs that may be price-linked but decoupled from production (that is, no requirement to produce to receive payments) to be considered as blue box, such as counter-cyclical payments.

If the U.S. proposals are adopted in the WTO, domestic policy reform is likely to be needed so as to not exceed the new limits. This is especially the case for the marketing assistance loan program and the dairy and sugar price support programs, key amber box programs.

A 60-percent reduction cuts the AMS ceiling to $7.6 billion. An estimate for the 2005/06 marketing year suggests an AMS of around $13 billion, so the U.S. proposal implies a real and substantial reduction in amber box support. Blue box spending is currently unconstrained. Based on a historical estimate of the value of production of around $200 billion, U.S. blue box spending would be limited to around $5 billion. The United States would be able to place counter-cyclical payments in the blue box, which are estimated for the 2005/06 marketing year at about $5 billion, and could reach a theoretical maximum of $7.6 billion. So again, the U.S. proposal would constrain such spending in some years. Allowed *de minimis* support would similarly fall by half; U.S. outlays have been

as high as $7 billion in this category (mainly nonproduct specific). There is also a current product specific *de minimis* level of 5 percent but the United States has notified very little in that category.

Brazil's successful challenge to U.S. cotton programs has significant direct and indirect implications for farm programs. In response to the WTO panel findings on prohibited subsidies, the United States made changes to one trade program, and legislation eliminated the Step 2 program for upland cotton. More importantly for domestic farm programs, however, is the panel finding on serious prejudice. The panel found that "price-based" U.S. domestic support measures—marketing loan payments, Step 2 payments, market loss assistance payments (no longer used), and counter-cyclical payments—caused serious prejudice in the sense of significant price suppression or depression in world cotton markets in 1999-2002.

To comply with the panel ruling, the U.S. was required to withdraw the subsidies or remove the adverse effects of the subsidies by September 21, 2005. The Step 2 program was eliminated as of August 1, 2006, but the United States has taken no direct action concerning marketing loan benefits or counter-cyclical payments.

The WTO findings raise a host of indirect issues for other commodities and farm programs. The most obvious is that the marketing loan and counter-cyclical programs apply to other commodities. The panel also concluded that direct payments are not in fact green box payments because of planting restrictions on fruits and vegetables. Although the United States is not required to directly address this finding, many other commodities also receive direct payments and this finding could have wide ramifications.

VI Alternative Approaches to Agricultural Risk Management

This section considers several alternatives to current risk management programs. The alternatives presented are not meant to be exhaustive, nor are they meant to represent specific farm bill proposals. No alternative is being advocated. Rather, the alternatives represent generalized approaches to addressing the concerns that have been raised with regard to current programs. They are presented as candidates for further public discussion to help inform the 2007 Farm Bill debate.

Alternative 1: Use the existing structure of farm programs, but make them more WTO consistent, reduce their effects on resource use and structure, and better target them to producers with the greatest need for assistance.

Participants at the USDA 2007 Farm Bill Forums and others have indicated support for the current mix of programs but were concerned about their vulnerability to challenge under WTO, particularly given the outcome of the recent WTO cotton case. Many also thought program benefits should be targeted towards small and mid-sized farms that are potentially more vulnerable to income variability. In addition, some have argued current programs encourage farm consolidation, since larger farms receive more assistance than small farms.

To address WTO and resource concerns about the production- and trade-distorting effects of current programs, marketing assistance loan rates could be reduced to minimize the probability of U.S. amber box support exceeding WTO limits. Producers could be compensated through a commensurate increase in direct payment rates. As counter-cyclical payments are subject to discipline in the WTO, counter-cyclical payment rates could also be reduced. In addition, stricter payment limitations could be put in place that would target payments towards smaller and mid-sized farms.

WTO implications. Amber box support (marketing assistance loan benefits and counter-cyclical payments) would be reduced significantly, but could be offset by increases in green box support (direct payments). Because of the WTO cotton ruling on direct payments, modifying the prohibition on planting fruits, vegetables and wild rice to ensure direct payments would continue to be exempt from discipline in the WTO would be prudent. Exceeding WTO limits on domestic support would continue to be a vulnerability, but that probability would be greatly reduced by the decline in marketing assistance loan benefits and counter-cyclical payments.

Effects on income risk. Marketing assistance loans would continue to provide a safety net in the event of large price declines, but would lessen the extent to which producers of program crops are insulated from market signals and thus lessen the possibility that commodity programs distort planting decisions. Increased direct payments would ensure that the current level of support is largely maintained for program crops. With less reliance on government support through marketing assistance loans, there would likely be increased demand for privately offered risk management tools, such as forward contracts, and futures and options. Demand for revenue insurance coverage would also likely increase.

Effects on budget, distribution of payments across commodities, and resources. Lowering marketing loan rates and the maximum counter-cyclical payment rates would reduce budget outlays; however, the level of savings would be determined by how much of the decrease in marketing loan benefits and counter-cyclical payments was offset by increased direct payments. Under this option, program benefits would continue to flow to those crops and producers that traditionally have benefited from commodity programs. As a result, land values and values of other assets of producers of traditional program crops would largely be maintained. However, benefits could shift marginally among program crops as more payments would be based on historical rather than actual plantings.

Effects of payment limitations. With a shift to direct payments in the 1960s as a means of supporting farmers, the size of payments to individuals came under scrutiny. Current payment limitations trace to 1970 when legislation established three separate payment limits of $55,000 for wheat, feed grains, and upland cotton. Since then, limits were changed several times, with the focus being on a dollar cap on various types of payments and some attempts to tighten eligibility requirements. The Commission on the Application of Payment Limitations in Agriculture concluded in 2003 that current payment limits reduce payments by 1-2 percent or $100-$200 million annually. The modest reduction in payments indicates that producers can reorganize their farm businesses to reduce the effectiveness of payment limits. Any new payment limit regime that addressed the dollar limits would also have to address the issue of who and what types of entities are eligible for payments. Assuming stricter or more effective limits could be implemented, they would most adversely affect cotton and rice producers, but every State would have some producers who would have payments and incomes reduced. Stricter payment limitations on land values, while expected to have little effect nationally, are likely to vary considerably from region to region. Tighter payment limits would likely have negligible effects on planted area, supply, demand, and prices, due to the shift of support from marketing assistance loans and counter-cyclical payments to direct payments.

Alternative 2: Replace marketing assistance loans and counter-cyclical payments with a program that pays producers based on revenue shortfalls.

A common theme expressed in many of the Farm Bill Forums was the desire to stabilize revenue. Programs that attempt to stabilize price or yield are not as efficient at stabilizing producer revenue as programs based on a target level of revenue. For example, a producer whose crop is affected by drought has less production and will receive less in marketing assistance loan benefits. Also, counter-cyclical payments do not compensate producers whose crops are affected by drought, since payment yields are fixed and they might not even be planting the base crop.

Under this option, marketing loans and counter-cyclical payment would be replaced with a program paying producers whenever farm revenue fell below a target revenue level. In designing such a program, several questions arise. These include:

- Should target revenue be based on individual commodities or whole farm revenue?
- At what level of aggregation should the revenue level be determined?
- What should be the level of the revenue guarantee?
- Would a revenue-based program replace or complement the current crop insurance program?

The first issue is whether the target revenue is based on individual commodities or on whole farm revenue. Commodity-specific target revenue programs most closely mirror current crop-specific programs, while whole farm revenue guarantees would address aggregate farm revenue shortfalls more efficiently and cheaply because they would take into account potentially offsetting effects among

commodities. Whole farm revenue would include crops and livestock not currently covered by current commodity programs. However, record keeping needs for a whole farm revenue program may be quite large compared to single crop revenues, particularly for those producers who produce multiple commodities.

The second issue concerns the level of aggregation used to determine both the target revenue and the revenue shortfall. Programs that are based on individual farm-level revenue would most effectively mitigate revenue shortfalls; however, they would require extensive record keeping and oversight to prevent fraud and abuse. Moreover, if the revenue guarantee is set too high, producers may have little incentive to produce or market a crop in the most efficient and timely manner, similar to the "moral hazard" problem that occurs when insurance guarantees are set above the market value of the insured commodity. The more farm-specific the calculation of the revenue shortfall, the lower the incentive would be for a farmer to use private sector risk management tools.

Alternatively, a target revenue program could be based on an area-based revenue (e.g., county revenue), where every producer within the area would receive the same payment rate. Basing program payments on area-based revenue would provide sufficient incentives to produce and market crops efficiently and would minimize record keeping requirements. However, such a program would less effectively mitigate risk than an individual-based program, since area-based revenue is less correlated with an individual producer's revenue.

The third issue relates to the level of the target revenue guarantee. One option would base the target revenue guarantee at 70 percent of expected market revenue. Such a program would be generally consistent with WTO criteria for green box programs. Savings from such a program could be provided to producers in the form of direct payments (also green box) or redirected to other types of programs, such as rural development, conservation, or research. Alternatively, a target revenue program could be based on current target price levels. Such a program would give producers similar levels of protection as under current programs, but would be more effectively targeted to shortfalls in revenue, rather than simply price. Because the level of benefits would be similar to current programs, vulnerability to WTO challenges, while potentially lower than under current programs, would remain, particularly if revenue payments were based on planted area rather than historical area. A third alternative would be to provide an overall revenue guarantee by basing a portion of the guarantee on an individual-based program and a portion on an area-based program, designed to fit within current or future WTO constraints. The higher the level of the guarantee, the more the program objective moves beyond revenue stabilization and toward revenue enhancement.

The fourth issue concerns whether a revenue-based program substitutes for the current Federal crop insurance program or whether the two programs operate together. For example, since a revenue-based program would protect production that is adversely affected by weather, it could be argued that a revenue-based program would eliminate the need for Federal crop insurance. In fact, many Federal crop insurance policies are already revenue based. Alternatively, a revenue-based program could be developed that completely substitutes for the current Federal crop insurance program in terms of commodity coverage and the variety of risk management products currently available. Under the current crop insurance program, a revenue-based program with a guarantee set above expected market revenue (revenue enhancement) would be viewed as "over insurance" and inconsistent with the current actuarially sound crop insurance program.

WTO implications. In general, the less a target revenue program is tied to actual farm revenue, the less likely the program is considered amber box and subject to potential reduction commitments under the WTO. However, current WTO green box criteria for income safety net programs would require target revenue guarantees to be set based on a maximum of 70 percent of the average farm revenue of the preceding 3 years (or 5 years, excluding the high and low years). These criteria apply to both individual and area-based revenue guarantee programs. In comparison, a target revenue program based on current target price levels would establish a target revenue guarantee of well in excess of average market revenue for program crops.

Effects on income risk. Target revenue programs are generally more effective in stabilizing farm income the closer they are targeted to an individual producer's whole farm revenue. As mentioned above, this must be balanced with other concerns, such as ensuring appropriate market incentives for producers to produce and market their crops

efficiently, providing incentives for producers to use private sector tools for managing risk, and avoiding excessive record keeping.

Effects on budget, distribution of payments across commodities, and resources. Replacing current marketing loans and counter-cyclical programs with commodity-specific target revenue programs would likely result in cost savings if the level of the revenue guarantee were set to provide protection similar to current programs. This is because price and yield tend to move in opposite directions, providing a partial offset in the calculation of a producer's actual revenue. The distribution of benefits among producers would remain roughly similar as under current programs, although payments to areas and crops where revenue variability is higher (e.g., Northern and Southern Plains) would be somewhat greater. For a revenue-based program, payments are determined by both price and yield movements, which can vary significantly depending on crop and region. The cost savings could be used to address needs of the non-program and livestock sectors or fund other programs that would support agriculture and rural areas.

The costs of basing target revenue on a whole farm concept and extending coverage to non-program commodity producers would depend on the level of coverage and the extent of eligibility. Such a program, if extended to nonprogram commodities, could result in a significant relative shift in benefits from producers of traditional program crops to producers of nonprogram crops and livestock, and would likely result in commensurate increases in land values for newly covered commodities and potential shifts in land use. Effects on current program crop producers could be mitigated by increasing direct payments for program crops, but this would increase program costs, unless offset by lowering the revenue guarantee for all producers.

Alternative 3: Phase out marketing assistance loans, direct payments, and counter-cyclical payments, and use savings to expand crop insurance coverage, fund farm savings accounts, and/or expand conservation, rural development, or other programs.

Many Farm Bill Forum participants supported expansion of conservation and rural development programs. Conservation and rural development programs help all farmers, not just traditional program crop producers. In addition, farm savings accounts have been promoted as an alternative to help stabilize incomes.

Increased funding for conservation programs in the 2007 Farm Bill has been a topic of interest. While conservation and environmental programs will be discussed in a subsequent theme paper, it is important to note that conservation programs can aid in risk mitigation through improved soil and water management, technical assistance, and stewardship programs. In addition to reducing risk and addressing conservation goals, conservation-based payments can also be viewed as payments for ecosystem services that producers provide, in addition to their commodity production. If designed properly, conservation programs have the added benefit of being green box programs under the WTO and hence exempt from reduction commitments. Shifting payments to meet conservation goals could result in a significant shift of program benefits from current program crop producers to areas and practices that yield larger environmental benefits.

Funding for counter-cyclical payments and marketing assistance loans could also be redirected to meet broader agricultural and rural development needs, such as providing improved agricultural and rural infrastructure or stimulating rural economic development through the development of new markets and other opportunities. Such funding would largely be WTO-consistent and could potentially provide risk management for farm households through greater off-farm employment opportunities. For example, funds could be provided to States in the form of block grants based on the current distribution of commodity payments; however, shifting funds to meet broader rural development goals could shift benefits away from producers to rural residents in general. Rural development programs will also be the focus of a subsequent theme paper.

In recent years, several proposals have been put forward for a whole-farm revenue safety-net program not linked to production of particular commodities and potentially available to all farms. Prominent among these proposals are farm income stabilization or savings accounts. Farm income stabilization or savings accounts are designed to encourage farmers to manage risk by making deposits to special accounts in high-income years and making withdrawals, when needed, in low-income years. The Government would provide incentives, such as tax deferrals and/or matching contributions, to encourage farmer participation and to help farmers accumulate reserves.

Income stabilization accounts have the potential to overcome some of the disadvantages of current farm safety net programs, since they could be applied to a wide variety of farming situations and could be decoupled from individual crop production decisions. However, risk protection under income stabilization accounts would depend upon the reserves in individual accounts, which could vary with the level of participation, the generation of new savings, and the distribution or concentration of program benefits. While USDA analyses of three prominent farm savings account proposals suggest that some farmers could build balances over time, the use of a tax-based net or gross income measure to determine eligibility and the limited capacity of some farmers to make eligible deposits suggest that the distribution of program benefits could be even more concentrated than under current programs. Farm savings accounts may not provide sufficient coverage for many farmers, especially in the early years of the program or when successive disasters deplete funds. At the same time, depending upon the structure of the program, some farmers may be allowed to build subsidized balances beyond the levels necessary to satisfy risk management goals.

WTO implications. Phasing out commodity programs would eliminate amber box support programs. WTO implications would depend on how the savings were redirected in other areas. For example, increased spending on conservation and other programs would have to be consistent with WTO green box criteria for such programs to avoid simply shifting amber box support from one type of program to another.

Under current WTO criteria, income stabilization accounts would not be considered green box unless the trigger for withdrawal was set at 70 percent of the average income level over the previous 3 years (or previous 5 years, excluding the high and low). Other countries' experience with stabilization accounts (e.g., Canada's Net Income Stabilization Account and its successor, Canadian Agricultural Income Stabilization program) set trigger levels at 85 percent of net farm income.

Effects on income risk. This option would shift program benefits from traditional program crop producers to broader participation based on other goals, such as conservation, rural development and agricultural infrastructure, such as research. Income risk protection would decline for traditional program crop producers but likely increase for other commodity producers. The alternative would leave in place the Federal crop insurance program to provide a safety net for producers. In addition, producers would have another tool for managing risk, farm savings accounts. In general, as current program support is phased down, producers of traditional program crops would be expected to expand their use of private sector risk management tools, since the level of government-provided risk protection would decline relative to current programs.

Effects on budget, distribution of payments across commodities, and resources. Eliminating direct and counter-cyclical payments and marketing assistance loans over time would eventually reduce Federal spending substantially. Part or the entire savings would be used to improve crop insurance and expand conservation, rural development, or other programs to meet the broad needs of all producers. The reduction in payments to traditional program crops and expansion in crop insurance, conservation, rural development, and other programs, along with the authorization for farm savings accounts, would result in a significant shift in benefits from producers of traditional program crops to producers of nonprogram crops and livestock. Due to potential adverse effects on the land and asset values of program crop producers from such a proposal, program implementation would be gradual over a number of years. The phasing out of current programs would eliminate the income enhancement of current programs, focus on income stabilization, and lead to a more market-oriented agricultural sector by increasing producer responsibility for risk management and removing the negative aspects of current programs to expand production and plant certain crops.

VII Suggestions for Further Reading

The following is a list of selected USDA publications related to the issues raised in this paper.

Claasen, Roger and Mitch Morehart. *Greening Income Support and Supporting Green*, Economic Research Service, USDA, Economic Brief No. (EB1) 6 pp, March 2006. **http://www.ers.usda.gov/Publications/EB1/**

Dismukes, Robert, and Joseph Glauber. "Why Hasn't Crop Insurance Eliminated Disaster Assistance?" *Amber Waves*, Economic Research Service, USDA, June 2005. **http://www.ers.usda.gov/AmberWaves/June05/Features/WhyHasntCropInsurance.htm**

Farm Business and Household Survey Data: Customized Data Summaries from the Agricultural Resource Management Survey (ARMS). USDA, March 2006. **http://www.ers.usda.gov/Data/ARMS/**

Hamrick, Karen (Editor). *Rural America At A Glance*, 2005. Economic Research Service, USDA, Economic Information Bulletin No. (EIB4) 6 pp, September 2005. **http://www.ers.usda.gov/Publications/EIB4/**

Harwood, Joy, Richard Heifner, Keith Coble, Janet Perry, and Agapi Somwaru. *Managing Risk in Farming: Concepts, Research, and Analysis.* Economic Research Service, USDA, Agricultural Economics Report No. (AER774) 136 pp, March 1999

Jones, Carol A., Hisham El-Osta, and Robert Green. *Economic Well-Being of Farm Households.* Economic Research Service, USDA, Economic Brief No. (EB7) 6 pp, March 2006. **http://www.ers.usda.gov/Publication/EB7/**

Lambert, Dayton, Patrick Sullivan, Roger Claassen, and Linda Foreman. *Conservation-Compatible Practices and Programs: Who Participates?* Economic Research Service, USDA, Economic Research Report No. (ERR14) 48 pp, February 2006. **http://www.ers.usda.gov/Publications/err14/**

MacDonald, James, Janet Perry, Mary Ahearn, David Banker, William Chambers, Carolyn Dimitri, Nigel Key, Kenneth Nelson, and Leland Southard. *Contracts, Markets, and Prices: Organizing the Production and Use of Agricultural Commodities.* Economic Research Service, USDA, Agricultural Economic Report No. (AER837) 81 pp, November 2004. **http://www.ers.usda.gov/Publications/aer837/**

MacDonald, James, Robert Hoppe, and David Banker. *Growing Farm Size and the Distribution of Farm Payments.* Economic Research Service, USDA, Economic Brief No. (EB6) 6 pp, March 2006. **http://www.ers.usda.gov/Publications/EB6/**

Report of the Commission on the Application of Payment Limitations for Agriculture, Submitted in Response to Section 1605, Farm Security and Rural Investment Act of 2002. Office of the Chief Economist, USDA, 168 pp, August 2003. **http://www.usda.gov/oce/reports/payment_limits/index.htm**

U.S. Department of Agriculture. Economic Research Service. "Trade Issues and Agreements: U.S. WTO Domestic Support Reduction Commitments and Notifications." **http://www.ers.usda.gov/briefing/farmpolicy/usnotify.htm**

Westcott, Paul C., C. Edwin Young, and J. Michael Price. *The 2002 Farm Act: Provisions and Implications for Commodity Markets.* Economic Research Service, USDA, Agriculture Information Bulletin No. (AIB778) 67 pp, November 2002. **http://www.ers.usda.gov/Publications/aib778/**

Young, Edwin. "Government payments and the farm sector: Who benefits and how much?" Farm and Commodity Policy Briefing Room, Economic Research Service, USDA, March 2005, 12 pp. **http://www.ers.usda.gov/briefing/FarmPolicy/gov-pay.htm**

APPENDIX TABLE 1. Distribution of Government Payments to Producers by Various Characteristics, 2004

	Number of Farms	Number of Farms Receiving Payments	Percent of Farms Receiving Payments	Government Payments (Thousand $)	Share of Government Payments %
FARM TYPOLOGY					
Rural residence farms	1,373,956	406,901	49.8	1,735,839	16.9
Intermediate farms	529,071	270,386	33.1	2,821,207	27.6
Commercial farms	204,898	140,338	17.2	5,677,093	55.5
FARM TYPE					
Cash grain and soybean	315,728	287,583	35.2	5,489,384	53.5
Other field crops	419,393	215,923	26.4	1,509,302	14.7
Cotton	16,230	15,980	2.0	788,245	7.7
High valued crops	139,052	*13,778	*1.7	207,483	1.9
Beef cattle	734,305	187,194	22.9	1,251,766	12.3
Hogs	33,579	14,640	1.8	280,341	2.7
Poultry	#34,434	#5,885	#.7	66,971	0.7
Dairy	60,461	47,312	5.8	492,849	4.8
General livestock	*354,743	@29,330	#3.6	170,554	1.7
OPERATOR HOUSEHOLD INCOME					
Negative or no income	102,794	55,012	6.7	1,199,592	11.7
Positive but less than $25,000	373,343	129,727	15.9	808,848	7.9
$25,000 to $49,999	486,498	174,373	21.3	1,243,461	12.2
$50,000 to $99,999	625,995	230,318	28.2	2,238,461	21.9
$100,000 to $149,999	*218,849	92,712	11.3	1,263,016	12.3
$150,000 to $199,999	96,570	38,503	4.7	772,024	7.5
$200,000 or more	156,772	75,371	9.2	2,372,754	23.2
Nonfamily farm	47,103	21,610	2.6	335,560	3.3
SIZE OF PAYMENT					
Positive but less than $25,000	707,909	707,909	86.6	3,757,581	36.7
$25,000 to $49,999	64,369	64,369	7.9	2,293,660	22.4
$50,000 to $74,999	22,514	22,514	2.8	1,342,059	13.1
$75,000 to $99,999	12,086	12,086	1.5	1,036,833	10.1
$100,000 to $149,999	5,727	5,727	0.7	684,772	6.7
$150,000 or more	5,020	5,020	0.6	1,119,430	10.9
SALES CLASS					
Less than $10,000	1,201,417	267,292	32.7	582,162	5.7
$10,000 to $49,999	400,288	183,643	22.5	941,170	9.2
$50,000 to $99,999	170,201	112,485	13.8	1,052,860	10.3
$100,000 to $249,999	167,948	131,182	16.0	2,101,798	20.5
$250,000 to $499,999	88,863	70,526	8.6	2,256,761	22.1
$500,000 to $999,999	44,728	30,761	3.8	1,648,759	16.1
$1,000,000 or more	34,480	21,736	2.7	1,650,501	16.1
NET CASH INCOME					
-$40,000 or less	*61,878	27,919	3.4	901,560	8.8
-$39,999 to	*272,050	78,285	9.6	429,941	4.2
-$9,999 to $0	788,187	161,103	19.7	480,892	4.7
Positive but less than $10,000	444,854	184,873	22.6	840,063	8.2
$10,000 to $39,999	267,506	161,418	19.7	1,473,746	14.4
$40,000 to $99,999	143,959	103,336	12.6	1,789,366	17.4
$100,000 or more	129,491	100,691	12.3	4,318,737	42.1
ACRES OPERATED					
Less than 100 acres	1,053,565	190,685	23.3	405,206	4
100 to 249 acres	464,248	212,145	25.9	838,397	8.2
250 - 499 acres	255,007	153,542	18.8	1,217,127	11.9
500 - 999 acres	154,247	113,797	13.9	1,978,588	19.3
1,000 to 1,999 acres	101,048	82,191	10.1	2,629,537	25.7
2,000 acres or more	79,811	65,264	8.0	3,165,174	30.9

* indicates that the standard error of the estimate is greater than 25 percent and less than or equal to 50 percent

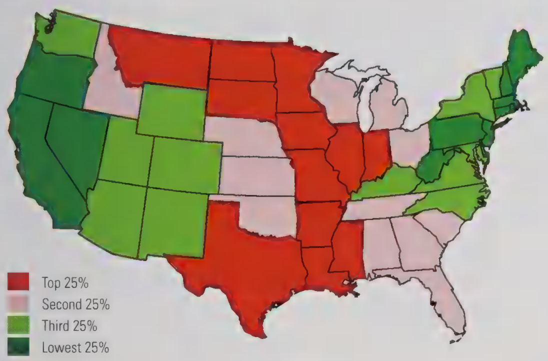
\# indicates that standard error is greater than 50 percent and less than or equal to 75 percent

@ indicates that the standard error of the estimate is greater than 75 percent

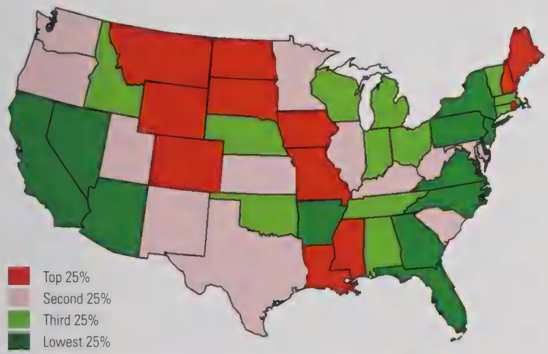
Source: Economic Research Service, Agricultural Resource Management Survey, 2004

APPENDIX FIGURES

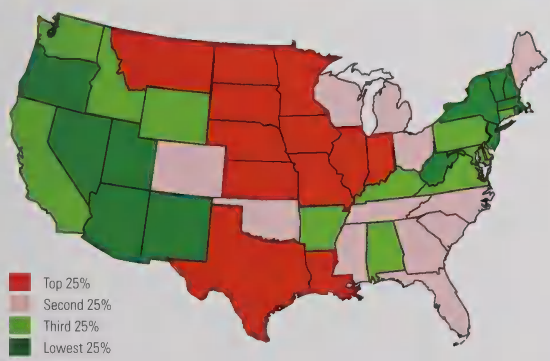
Commodity Payments as a Percent of Gross Cash Receipts, State Rankings, 2004



Conservation Payments as a Percent of Gross Cash Receipts, State Rankings, 2004



Crop Insurance Premium Subsidies as a Percent of Gross Cash Receipts, State Rankings, 2004



2 Conservation and the Environment

I Introduction

This paper is the second in a series of papers that assess general views advanced at the 2007 Farm Bill Forums held during 2005 by Secretary Mike Johanns as well as additional ideas that have emerged in recent months. In general, public comments from the Secretary's Forums were supportive of conservation programs that assist farmers and ranchers in making structural and management changes on agricultural lands in order to reduce erosion, enhance wildlife habitat, and improve water and air quality. Support was also expressed for the protection of wetlands and the preservation of farm and ranch lands. This paper discusses natural resource issues, USDA conservation programs administered by the Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS), and policy alternatives. The alternatives represent possible approaches to addressing conservation and environmental issues on agricultural lands. They are presented for public discussion and are not being advocated.

II Background: Conservation and U.S. Agriculture

Non-Federal agricultural and forest lands occupy 1.4 billion acres or nearly 70 percent of the contiguous United States. These lands are the foundation of strong and vibrant agriculture and forest sectors. They also provide the habitat and corridors that support healthy wildlife populations, filter groundwater supplies, regulate surface waters flows, sequester carbon, and provide open space and scenic vistas that improve the quality of life for large segments of our population. These lands also support a growing population that is increasingly concerned about the effects of farming and ranching on the environment.

While many farmers and ranchers have a strong conservation ethic and produce in sustainable ways, farming and ranching can include activities that may have negative environmental consequences. Crop and animal production can affect water and air quality, water flows, and wildlife habitat. Fertilizers, insecticides, pesticides, and livestock waste can enter ground and surface water, adversely affecting water quality. Overgrazing and cropping fragile lands can increase particulate matter in the air. The conversion of grasslands to cropland can increase soil erosion and reduce wildlife cover.

As the U.S. population grows, demand for land for nonagricultural uses, such as roads, shopping centers, housing, recreation, and open space increases, resulting in conversion of agricultural land to nonagricultural and non-forestry uses and fragmentation of open space. Population growth in the past few decades has been high in the West, where water supplies are generally limited and many ecosystems are fragile. Greater population densities can exert greater pressures on the environment. Population growth and affluence have also increased the demand for food and fiber produced in ways that are more in harmony with the environment. Finally, the past year has seen an accelerated interest in the production of renewable fuels which may bring marginal cropland into production.

Conservation is a continuing process, not a threshold that, once achieved, can be ignored or set aside. And while conservation programs have made progress, new conservation issues continue to emerge as land use changes, population grows and becomes increasingly mobile, technology changes, and research identifies relationships between farming and ranching practices and environmental indicators. Current conservation concerns include but are not limited to: water quality, water supply, soil quality, invasive species, wildlife habitat, endangered species, agricultural land preservation, and air quality.

Federal Role in Conservation

The effects of farming and ranching on water and air quality, wildlife habitat, and other environmental indicators do not necessarily factor into an individual producer's production decisions. In addition, farmers, ranchers, and the public may not be fully aware of the offsite effects of production practices on longer term environmental performance. These longer term effects have given rise to Federal programs that address a variety of environmental concerns on agricultural lands.

Conservation programs have been part of farm policy since the 1930s, when Congress found:

... the wastage of soil and moisture resources on farm, grazing, and forest lands of the Nation, resulting from soil erosion, is a menace to the national welfare and that it is hereby declared to be the policy of Congress to provide permanently for the control and prevention of soil erosion and thereby to preserve natural resources, control floods, prevent impairment of reservoirs, and maintain the navigability of rivers and harbors, protect public health, public lands ...

Historically, the bulk of conservation program funding focused largely on maintaining the productivity of cropland. Assistance primarily focused on vegetative, engineering, and crop management measures to control soil erosion. Strip cropping, terracing, drainage, crop rotation, contouring, pasture management, tree planting, and other measures became part of farm conservation plans. Programs also included watershed planning and flood prevention activities, including structural and land treatment measures.

While there were significant conservation programs from the 1930s through the 1950s, the current era of programs emerged with the 1985 Farm Bill, with succeeding Farm Bills expanding the scope and funding for conservation programs. Major pieces of legislation include:

- The 1985 Farm Bill established the Conservation Reserve Program (CRP), which provided payments to producers to put environmentally sensitive cropland into conserving uses for 10 to 15 years. The 1985 Farm Bill also included sodbuster, swampbuster, and the highly erodible land provisions that tied eligibility for farm price and income support and other program benefits to adoption of soil and wetland conservation practices on fragile lands.
- The 1990 Farm Bill created a Federal program to restore and place conservation easements on wetlands—the Wetlands Reserve Program (WRP). The 1990 Farm Bill also authorized the Water Quality Incentives Program (WQIP) that signaled the emergence of water quality as a primary environmental objective of conservation programs.
- The 1996 Farm Bill created the Environmental Quality Incentives Program (EQIP) by consolidating the Agricultural Conservation Program, WQIP, the Colorado Salinity Program, and the Great Plains Conservation Program. In addition, the 1996 Farm Bill authorized the Farm and Ranch Land Protection Program (FRPP) and the Wildlife Habitat Incentives Program (WHIP).
- The 2002 Farm Bill vastly increased funding for conservation on lands in crop and animal production, or "working lands," by authorizing increased spending for several programs authorized under prior Farm Bills and establishing the Conservation Security Program (CSP) and the Grassland Reserve Program (GRP) for the long-term protection and restoration of grasslands.

There are four basic approaches to address conservation and environmental concerns on farm and ranch lands, including: (1) education and technical assistance, (2) economic incentive payments, (3) conservation compliance, and (4) regulatory requirements. A key difference among these approaches is the degree to which producer participation is voluntary. (See Appendix Table 1 for an overview of conservation program tools.)

Education and Technical Assistance

Technical and educational assistance programs are used by USDA and the private sector to work with producers and other stakeholders to develop and implement conservation systems, sustainable production techniques, and conservation technologies that achieve natural resource objectives. Technical and educational assistance includes direct technical expertise and assistance; conservation practice standards and technology; and natural resource inventories, data, and information that USDA provides to producers and other stakeholders.

Financial Incentives

Financial incentives delivered by USDA are designed to encourage and enable owners and operators to meet natural resource conservation objectives in concert with their particular economic or personal circumstances. Financial incentive programs can be grouped by objective:

- ***Conservation on Working Farm, Ranch, and Forest Lands.*** Payments are provided to operators and owners of working lands and forests who implement conservation measures and systems to address natural resource concerns. These may include incentive and cost-share payments for undertaking management or structural measures or stewardship payments to producers who have established and managed conservation measures and are maintaining them through their own financial resources. Conservation incentive programs for working lands, in combination with technical assistance, also are a means of reducing the economic burden on producers from Federal and State regulations on air and water quality. In addition, Federal research and grants help stimulate the development and adoption of innovative conservation approaches and technologies.
- ***Conversion of Farm and Ranch Land to Conserving Uses To Achieve Specific Environmental Benefits.*** Payments for placing agricultural land into conserving uses are designed to protect sensitive, prime, and unique lands. Generally, producers receive annual rental or easement payments in return for long-term dedication of cropland to a specific environmental or resource-conserving use. Long-term land rental and easement programs are well suited for providing environmental benefits that increase with the length of time land is removed from agricultural production.
- ***Protection of Agricultural Lands from Conversion to Other Uses.*** Agricultural land protection programs purchase rights to certain lands in order to keep land in agricultural and forest uses. Permanent easements provide a stream of conservation and landscape protection benefits in perpetuity.

Conservation Compliance

Because producers and others have a responsibility to minimize the environmental impacts of their activities, legislation has made eligibility for certain programs contingent on producers taking specific actions to address natural resource concerns. Such conservation compliance provisions were first introduced in the 1985 Farm Bill and have been included in subsequent Farm Bills. Conservation compliance objectives are designed to: (1) reduce soil erosion on the Nation's cropland; (2) protect the Nation's long-term capability to produce food and fiber; (3) reduce sedimentation and improve water quality; and (4) preserve and protect the Nation's wetlands.

Conservation compliance provisions require farmers to undertake resource conservation activities to remain eligible for price and income support payments and other USDA program benefits. Producers must apply an approved conservation plan that provides a substantial reduction in soil erosion or a substantial improvement in soil conditions on highly erodible cropland. Participants must also certify that they have not produced crops on wetlands converted after December 23, 1985, and did not convert a wetland to agricultural production after November 28, 1990. Compliance is voluntary in that producers may choose not to participate, in which case they are ineligible for USDA farm program benefits.

Regulatory Requirements

The Federal Government has also passed laws to prohibit certain actions such as impairing water or air quality, destroying wetlands, or destroying habitat of protected species. An objective of current conservation programs is to assist producers in meeting the regulatory requirements under these laws and avoid further regulatory action in the future by adopting conservation practices that provide environmental benefits. Major Federal regulations affecting crop and livestock producers include:

- The Clean Water Act (CWA) includes a number of sections that directly affect certain agricultural activities or enterprise types:
    - The National Pollutant Discharge Elimination System (NPDES) and Effluent Limitation Guidelines regulate waste handling and disposal by large concentrated animal feeding operations (CAFOs). Operations defined as CAFOs must obtain NPDES permits and face penalties for failing to meet permit terms.

- Section 303(d) of the CWA establishes total maximum daily load (TMDL) requirements. TMDLs may indicate that certain agriculturally related pollutants need to be significantly reduced, which could affect U.S. agriculture and the forest products industry.
- Section 404 of the CWA regulates the filling or dredging of certain wetland resources. Operators may be required to obtain permits and mitigate wetland losses.

- The Clean Air Act (CAA) regulates emissions of certain pollutants, a number of which can be associated with agriculture. Where agriculture is identified as a source of air pollutants in air quality non-attainment areas, State plans may require operators to reduce regulated emissions. Increasingly, State and local jurisdictions are regulating agricultural emissions that affect local air quality.
- The Endangered Species Act (ESA) provides for protection of species listed as threatened and endangered. Farmers and forest landowners whose lands include habitat for species listed under the ESA may find their activities restricted. Forest and farmland stewardship programs and safe harbor provisions can help land managers implement practices to reduce the effects of agricultural activities on endangered species.

IV Federal Cost of Conservation Programs and Distribution of Assistance

This section examines Federal spending for conservation programs and the distribution of conservation enrollment and payments. Data on conservation payments by program are presented, followed by data on the distribution of conservation payments regionally and across farm types. Budget data for conservation programs are complicated because there are both payments to producers and technical assistance costs related to each program, as well as broader conservation technical assistance costs. In addition, some programs obligate funds for multiyear contracts year by year, while other programs show the multiyear obligations in the year the contract begins. For comparability, much of the data in this section is for calendar year payments to producers.

Conservation Payments by Program

The 2002 Farm Bill authorized a historic increase in funding for private lands conservation programs. Based on Congressional Budget Office estimates, the 2002 Farm Bill increased funding (budget authority) for conservation programs by over $17 billion during FY 2002-11, as several existing programs were extended and new programs were created to address resource concerns on working lands. This expansion increased Federal funding (NRCS program obligations plus CRP outlays) of USDA's conservation programs, including technical assistance, to $4.7 billion in FY 2005, compared with $3.0 billion in FY 2001. A short description of some of the key USDA conservation programs follows, with added information in Appendix Table 2.

The Conservation Reserve Program (CRP) places environmentally sensitive cropland in conserving uses for 10 to 15 years. In return for an annual rental payment and partial reimbursement for the cost of establishing and maintaining approved groundcover, participants agree to plant grasses, trees, and other conserving cover crops, restore wetlands, and establish buffers. Annual rental payments on land enrolled in the CRP average $48.43 per acre and are limited to $50,000 per person. In 2005, operators and landowners were paid about $1.8 billion in rental payments, cost-share payments, signing incentive payments, practice incentive payments, and wetland restoration incentives on 35 million acres of enrolled land. Under the 2002 Farm Bill, enrollment in the CRP is limited to a maximum of 39.2 million acres.

Since 1996, producers have had the option of enrolling land through a continuous signup program focused on developing riparian buffers and other specific conservation practices. Two million acres of riparian buffers and grass filter strips have been enrolled to date. In 1997, USDA implemented the Conservation Reserve Enhancement Program (CREP), a Federal-State partnership that targets cropland in specific geographic areas, to further local conservation goals. Nearly 800,000 acres have been enrolled in CREP.

The Wetland Reserve Program (WRP) restores and preserves wetlands that have been converted to cropland. The 2002 Farm Bill authorized enrolling slightly over 2 million acres in WRP. WRP restores and protects wetlands through cost-share assistance and purchase of 30-year and permanent easements. Easement payments are limited to $50,000 per person per year. This limitation does not apply to WRP payments on land enrolled in permanent easements. In 2005, farmers and landowners were paid $161 million for easement and restoration activities. By the end of 2005, WRP enrollment was 1.7 million acres.

The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to help participants install or implement conservation practices on eligible agricultural land. EQIP is designed to help farmers institute conservation practices and integrate conservation structures into their farming operations. For structural or vegetative practices, EQIP can reimburse up to 75 percent of the installation costs, although the 2005 EQIP data indicate that the national average cost share rate is about 60 percent. Producers can also receive financial incentives for adopting certain management practices. EQIP payments are limited to $450,000 per person for all EQIP contracts entered into during FY 2002-07. Under the 2002 Farm Bill, 60 percent of EQIP funds must be targeted at practices relating to livestock production. In 2005, $444 million in EQIP funds were paid on 63,800 producer contracts to producers to implement 136,200 practices on 94.5 million acres to improve air, soil, and water quality. The EQIP program level for FY 2005 was $950 million, reflecting current year payments and contract obligations for future years.

The Conservation Security Program (CSP), authorized by the 2002 Farm Bill, rewards producers for ongoing environmental stewardship on working lands. In addition, CSP provides financial incentives for producers to adopt additional conservation practices on their farming operations. Under the program, producers agree to maintain and implement designated conservation practices for a period of 5 to 10 years. In return, participating producers receive payments that increase as producers address additional resource concerns on a larger portion of their farm operation. The amount of payments a producer may receive over the period covered by a CSP contract varies from $20,000 to $45,000, depending on a producer's commitment to maintaining and adopting new conservation practices.

In 2004, the first year of the program, eligibility was limited to 18 watersheds with 2,200 farmers enrolling about 2 million acres. The number of watersheds eligible for CSP expanded to 220 in 2005, and 12,800 farmers enrolled 10.2 million acres in contracts. Producers received $206 million in CSP payments in 2005. In 2006, 60 additional watersheds will be eligible for enrollment. The funding level for CSP has changed multiple times, adding complexity to program implementation.

The Grassland Reserve Program (GRP) helps landowners and operators restore and protect grassland resources, including rangeland and pastureland, while maintaining the land's suitability for grazing. GRP emphasizes supporting grazing operations, enhancing plant and animal biodiversity, and preserving land containing shrubs or forbs under the greatest threat of conversion. Land must: (1) be grassland that contains forbs or shrubs, including rangeland and pastureland, or (2) be located in an area historically dominated by grassland, forbs, or shrubs with potential to provide habitat for animal or plants of significant ecological value, if the land is retained or restored to a natural condition. GRP participants must follow a conservation plan on all acres enrolled in the program.

Participants may enroll acreage in 10- to 30-year rental agreements, 30-year easements, or an easement for the maximum duration allowed under State law. Grazing is permitted in a manner that is consistent with maintaining the viability of natural grasses, shrubs, and forbs. Haying, mowing, or harvesting for seed production is also permitted. The 2002 Farm Bill authorized $254 million in funding for the GRP during FY 2003-07.

The Farm and Ranch Lands Protection Program (FRPP) authorizes the Secretary of Agriculture to purchase easements for the purpose of protecting cropland by limiting nonagricultural uses of the land. FRPP provides up to 50 percent of the appraised fair market value of the conservation easement. A participating entity may provide a maximum of 25 percent, in cash, of the appraised fair market value of the easement or 50 percent of the easement's purchase price. The majority of FRPP easements acquired are permanent.

To be eligible for FRPP assistance, a State or local governmental entity or nonprofit organization must have the staffing and financial capacity to acquire, hold, and manage conservation easements. USDA solicits proposals for FRPP participation. Once the proposals and their parcels are prioritized, USDA awards funds to eligible entities. It is the responsibility of the cooperating entity to hold, manage, and enforce acquired easements.

From 1996 to 2005, 49 States received nearly $371.5 million in FRPP funds. Approximately 449,000 acres on 2,290 farms, with an estimated cumulative easement value of nearly $1.1 billion, have or are committed to have FRPP easements. For every Federal dollar invested through FRPP, an additional $3 has been contributed by the participating State and local governmental entities, nongovernmental organizations, and landowners. In 2005, producers received $112 million in payments under the FRPP.

The Wildlife Habitat Incentives Program (WHIP) provides technical and financial assistance to enable eligible participants to develop upland wildlife, wetland wildlife, threatened and endangered species, and other types of wildlife habitat in an environmentally beneficial and cost-effective manner. Some WHIP conservation practices enhance farm profitability by improving grazing conditions, reducing management expenses, and producing non-crop income. The program has been used to control invasive species; re-establish native vegetation; manage nonindustrial forestland; stabilize streambanks; protect, restore, develop, or enhance unique habitats; and remove barriers that impede migration of certain species. The 2002 Farm Bill authorized $360 million in funding for WHIP during FY 2002-07. For FY 2005, $47 million was available for financial and technical assistance.

Conservation Operations consists of Conservation Technical Assistance (CTA), a program that provides direct technical expertise and assistance; conservation standards and technology; natural resource inventories, data, and information; training and certification; and incentives for conservation innovation to help producers protect natural resources on non-Federal lands. Grazing Lands Conservation (GLC) provides special emphasis within CTA on grazing land conservation activities. Conservation compliance activities also are carried out under CTA. CTA provides the technical interface essential for direct customized conservation planning and implementation assistance for discretionary as well as mandatory conservation programs. The FY 2005 funding (program level) for CTA was $696 million. Additional, discrete activities conducted under CTA include: the National Resources Inventory, which surveys natural resource conditions and trends on non-Federal lands and the Conservation Effects Assessment Project (CEAP), an effort to quantify the benefits delivered through conservation actions on private land.

The 2002 Farm Bill's Technical Service Providers (TSP) provision allows certified technical assistance providers to assist landowners with conservation projects. To date, more than 2,500 TSPs have been certified and $52 million in funding was obligated for TSPs in FY 2005.

Other Conservation Operations activities include the National Cooperative Soil Survey, which provides information for understanding, managing, conserving, and sustaining the Nation's soil resources and information to protect water quality, wetlands, and wildlife habitat; the Plant Materials Program, which conducts research on native plants to help solve natural resource problems; and Snow Survey and Water Supply Forecasting, which provides Western States and Alaska with information on future water supplies through collection and analysis of snowpack at more than 1,200 mountain sites.

Distribution of Payments

Distribution by Region. In calendar year 2005, nearly two-thirds of conservation payments went to farmers participating in the CRP (Appendix Table 3). CRP enrollment is concentrated in the Plains and western Corn Belt where cropland is prone to wind erosion (Figure 1).

Eight States each received more than $100 million in CRP payments in 2005. These States—Illinois, Iowa, Kansas, Minnesota, Missouri, Montana, North Dakota, and Texas—received 57 percent of CRP payments and about 46 percent of all conservation program payments in 2005.

EQIP payments tend to be more heavily concentrated in the Western States than CRP payments, reflecting both the distribution of cropland and the eligibility of livestock producers for assistance under EQIP. EQIP payments also appear to be slightly less geographically concentrated (Figure 2). In 2005, the top 8 States—California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, and Texas—received 38 percent of EQIP payments.

Farms Receiving Conservation Payments. The 2004 Agricultural Resource Management Survey (ARMS) provides calendar year information on conservation payments to the farm operator household. ARMS data indicate that 15 percent of all farms received conservation payments in 2004. For farms that received a conservation payment, conservation payments averaged $5,330 per farm, with conservation payments accounting for 4 percent of gross cash farm income. Gross cash income of farms receiving conservation payments averaged $136,545 in 2004. In comparison, gross cash income averaged slightly less than $100,000 for all farms in 2004. Many farms that received conservation payments also received commodity program payments and other forms of government support. In 2004, government payments averaged $4,855 per farm on all farms and $13,262 per farm on farms that received conservation payments, with conservation payments accounting for 40 percent of total government payments.

FIGURE 1. Distribution of CRP Payments, 2004

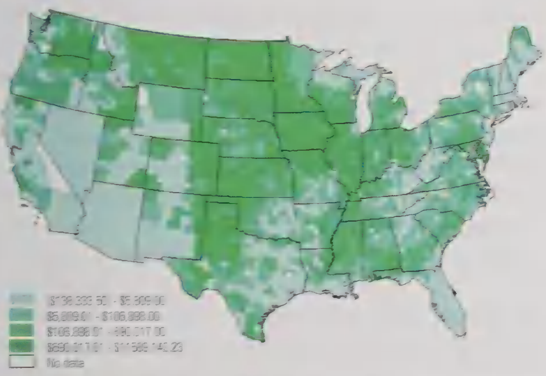
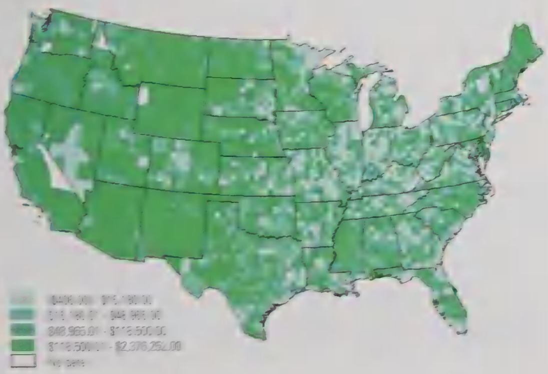


FIGURE 2. Distribution of EQIP Payments, 2004



Distribution by Commodity Specialization. Conservation payments were fairly similar across various commodity farm types in 2004. A farm's commodity specialization is determined by the one commodity or group of commodities that makes up at least 50 percent of the farm's total value of production. About 25 percent of cash grain and soybean farms and 38 percent of farms specializing in the production of other field crops received conservation program payments in 2004. Conservation program payments averaged $5,462 per farm on cash grain and soybean farms and $5,033 per farm on other field crop farms that received conservation payments.

While a lower percentage of livestock producers received conservation payments, the average payment per farm was very similar to crop farms. In 2004, about 10 percent or less of farms specializing in livestock production received conservation payments. For farms receiving conservation program payments and specializing in beef cattle production, conservation program payments averaged $6,244 per farm; poultry, $5,068 per farm; dairy $4,618, per farm; and hogs, $3,062 per farm.

Distribution by Farm Typology. An often used typology for grouping farms consists of three categories: ***commercial farms***, with sales of $250,000 or more and the farm operator reports farming as the major occupation (less than 10 percent of all farms); ***intermediate farms***, with sales under $250,000 and the farm operator reports farming as the major occupation (25 percent of all farms); and ***rural residence farms***, for which the farm operator's major occupation is not farming or the farm is a limited-resource farm (65 percent of all farms).

Of farms receiving conservation payments, rural residence farms were much more dependent on conservation payments as a source of income than other farm types. Fourteen percent of rural residence farms and 16 percent of intermediate farms received conservation payments in 2004, with payments averaging $4,414 and $6,497 per recipient farm, respectively. Conservation payments accounted for 79 percent of all government payments and 23 percent of gross cash income on rural residence farms that received conservation payments. Conservation payments

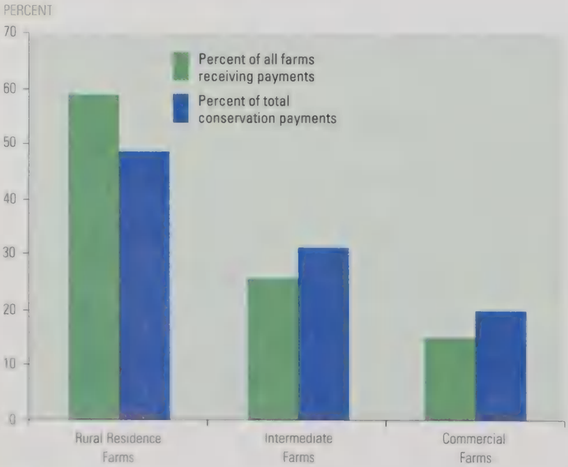
represented nearly one-half of all government payments going to intermediate farms that received conservation payments, with conservation payments accounting for 7 percent of gross cash income on these farms.

A larger percentage of commercial farms received conservation payments than rural residence and intermediate farms, but these payments made up a smaller share of total government payments and gross cash income. In 2004, 24 percent of commercial farms received conservation payments. The average conservation payment for commercial farms was $6,904 per recipient farm, which represented 16 percent of all government payments and only 1 percent of gross cash income.

Of just the farms receiving conservation payments, rural residence farms accounted for the largest share (Figure 3). In 2004, 59 percent of farms receiving conservation payments were rural residence farms, and these farms received 49 percent of total conservation payments. Commercial farms made up 15 percent of the farms receiving conservation payments and they accounted for 20 percent of conservation payments.

The distribution of conservation payments across farms tends to reflect participation in the CRP, since CRP comprises most of total conservation payments to producers. Nearly 60 percent of CRP payments go to rural residence farms. EQIP, on the other hand, focuses on a wide range of practices on cropland and grazing land and issues related to animal feeding operations (AFOs). Compared with CRP payments, a larger share of EQIP payments go to larger farms. The percentage of farms that participate in EQIP and other conservation programs does not appear to vary greatly with farm size. Preliminary unweighted data from the 2003 and 2004 USDA Conservation Effects Assessment Project (CEAP) surveys indicate that program participation is spread fairly evenly across farm size (Table 1).

FIGURE 3. Farms Receiving Conservation Payments and Payments Received by Farm Typology, 2004



Distribution by Farm and Household Income. In 2004, 13 percent of farms with net cash farm incomes of less than $10,000 received conservation payments in 2004, with payments averaging $3,804 per recipient farm. These farms received 45 percent of conservation payments and accounted for 63 percent of farms receiving conservation payments. In contrast, 23 percent of farms with net cash incomes of $100,000 or more received conservation payments and conservation payments averaged $7,882 per recipient farm. These farms received 14 percent of conservation payments and accounted for 9 percent of farms receiving conservation payments.

Farm households with household incomes of $200,000 or more, over 7 percent of all farm households and nearly 10 percent of all farm households receiving conservation payments, received 11 percent of conservation payments (Figure 4). Twenty-seven percent of all farm households receiving conservation payments had household income of $50,000-$99,999 and they received nearly 28 percent of all conservation payments in 2004. Forty-one percent of all conservation payments went to farm households with household incomes of less than $50,000, 45 percent of all farms receiving conservation payments.

TABLE 1. Share of Survey Respondents Participating in USDA Conservation Programs in 2003 and 2004

Size class in acres	No. survey responses	CSP	EQIP	WRP	WHIP
<100	1139	0.7%	3.1%	0.2%	0.2%
101-400	1994	0.5%	3.6%	0.0%	0.0%
401-1000	3424	0.5%	3.8%	0.1%	0.0%
1001-2000	3125	0.5%	4.5%	0.2%	0.1%
2001-3000	1862	0.5%	3.7%	0.2%	0.1%
>3000	874	0.8%	2.9%	0.2%	0.0%

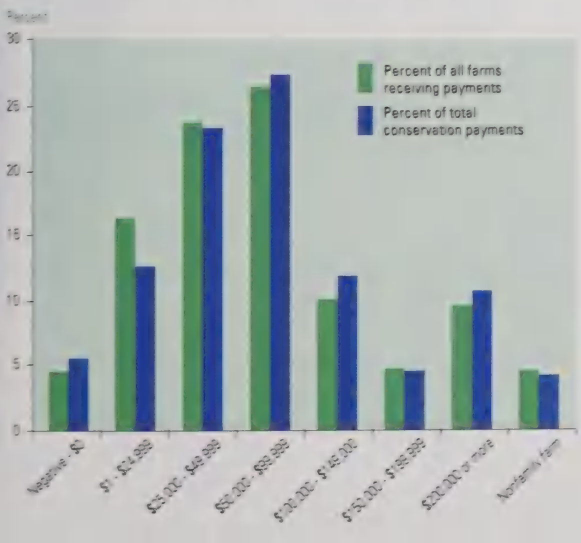
V General Performance of USDA Conservation and Environmental Programs

This section discusses the general performance of USDA conservation programs and identifies concerns that may guide the development of future conservation programs. Program issues addressed include: conservation and environmental benefits achieved, program costs and distribution of program assistance, economic and market impacts, and WTO implications.

Conservation and Environmental Benefits

Evaluation of the environmental benefits of conservation programs is difficult. Many factors beyond technical and financial assistance or program compliance affect behavior of producers and the changes in the condition of natural resources and the environment. For example, it may not be possible to establish the relationship between a dollar of technical or financial assistance received by a producer and the quality of a water body distant from the farm. A variety of studies have used different approaches to develop environmental indicators and assess the impacts of conservation programs. Program evaluation is not attempted in this paper. Instead, this section measures progress toward achieving environmental goals using several environmental indicators.

FIGURE 4. **Farms Receiving Conservation Payments and Payments Received by Household Income, 2004**



The combination of technical assistance, financial assistance, and conservation compliance programs has provided significant benefits that include the reduction of the offsite environmental effects of agricultural production, preservation of farm and ranch lands, restoration and enhancement of wetlands, and promotion of wildlife habitat. Technical assistance is used to develop the science and technology that form the basis for conservation practices. It is essential for working with producers to plan, design, implement, and maintain conservation measures in conjunction with financial assistance and conservation compliance provisions.

Soil erosion. Between 1982 and 2003, total erosion on U.S. cropland fell from 3.06 to 1.75 billion tons per year, a decline of 1.31 billion tons per year, or about 43 percent. Just over half, about 700 million tons per year, was due to reductions in sheet and rill (water) erosion, while about 610 million tons per year was due to reductions in wind erosion. Conservation compliance, CRP, EQIP and its predecessor programs, and changing production practices have been the major contributors to erosion reduction. A large majority of the total reduction in erosion, almost 1.2 billion tons per year, occurred between 1982 and 1997, when major USDA soil conservation programs were first implemented. Beginning in 1985, 1.7 million conservation plans were established for 142 million acres of highly erodible land to address conservation compliance. Between 1986 and 1990, CRP enrolled about 35 million acres, and at the start of 2006, contained about 36 million acres. Of the 1.2-billion-ton reduction in soil erosion between 1982 and 1997, about one-fourth has been attributed to conservation compliance (295 million tons per year), one-fifth (224 million tons per year) to CRP, and the rest to technological changes and other programs.

Lowering soil erosion sustains land productivity and reduces the off-site effects of agricultural production, such as water quality impairment in rivers and streams. Recent preliminary environmental benefit estimates for the CRP suggest water quality benefits from reduced sediment loads of $266 million per year, air quality benefits of reduced dust from wind erosion of $51 million per year, and soil productivity benefits of $161 million annually.

Wetlands. Since the late 1980s, wetland protection and restoration efforts have been assessed against a goal of "no net loss" of wetland functions and values. To maintain and increase wetland area and functions, previously drained wetlands must be restored while existing wetlands are conserved and, if necessary, enhanced. Wetland losses to agriculture (gross) have steadily declined since the mid-1950s, dropping from 593,000 acres per year during 1954-74, to 26,000 acres per year during 1992-1997. Based on National Resources Inventory data, agriculture surpassed the "no net loss" objective during 1997-2003, with a net gain of more than 260,000 wetland acres.

The WRP and CRP made major contributions to wetland restoration and enhancement. By the end of 2005, WRP enrollment was 1.8 million acres, much of it in long-term or permanent easements. As of April 2006, CRP included over 2 million wetland and buffer acres under 10-15 year contracts. Since 1985, the Swampbuster provision, which makes wetland conservation a condition of farm program payment eligibility, has been important in reducing wetland conversion for agriculture.

Wildlife habitat. Conversion of forest and grassland into cropland, roads, housing developments, and industrial uses, and increasing fragmentation of the agricultural landscape are the primary factors associated with habitat loss and endangerment of native wildlife species. Many factors influence the quality and extent of wildlife habitat on agricultural land, including management choices that sustain diversity and the protection of wetlands and associated uplands. Federal conservation programs, such as CRP, WRP, WHIP, and EQIP have made major contributions to wildlife habitat establishment and enhancement.

Research by the United States Geological Survey (USGS) has documented increases in grassland bird populations on CRP land that were in serious decline in the 1970s and 1980s. The U.S. Fish and Wildlife Service estimates that CRP has substantially increased duck and ring-necked pheasant populations. CRP is credited with the reappearance of prairie chickens in Texas, recovery of sharp-tailed grouse, and increases in Western State populations of big game elk, mule deer, white-tailed deer, and pronghorn antelope. Selected CRP wildlife-related benefits are estimated to be approximately $737 million per year, the majority being wildlife viewing (88 percent), followed by improved pheasant hunting in 13 North Central and Northern Plains States. This estimate excludes improved hunting for many species and increased protection of threatened and endangered species. EQIP and WHIP have been successful in improving habitat on working lands. WHIP has also contributed to aquatic species through dam removal, culvert replacement, and the installation of habitat structures that have opened spawning habitat. Targeted assistance in WHIP, GRP, and EQIP has protected 80,000 acres of sage grouse habitat.

Livestock. Addressing nutrient management and air quality concerns related to livestock operations, particularly CAFOs, has become an increasingly important objective of Federal conservation programs. USDA's conservation programs assist producers in meeting regulatory requirements that deal with potential air and water quality problems of animal waste. Since 60 percent of EQIP funds are required by statute to be devoted to animal agriculture, the distribution of EQIP assistance funds closely follows the distribution of dairy, pork, poultry, and beef populations (Table 2). A key goal has been the establishment of site-specific comprehensive nutrient management plans (CNMPs). During FY 2002 through 2006, 6,398 CNMPs were applied under EQIP contracts and under another 7,372 CNMPs were applied through Conservation Technical Assistance. Livestock producers also benefit from the 2002 Farm Bill CRP provision that allows for managed haying and grazing on CRP land protected under a conservation plan. Prior to this change, only temporary haying and grazing were allowed during periods of drought or other emergencies. The GRP has preserved historic grasslands which also may be hayed or grazed.

TABLE 2. EQIP Funding for Livestock

Species	Funding for FY 2003-FY 2005	Percent of total funding (Mil $)	Percent of species funding related to animal feeding operations	Percent of species funding related to grazing
Beef	825.1	65	16	84
Dairy	248.7	20	71	29
Poultry	73.3	6	89	11
Swine	43.1	3	70	30
Sheep	16.9	1	12	88
Horses	7.1	1	35	65
Other	46.0	4	14	86
Total	**1.26**	**100**		

Source: NRCS Protracts data

Water quality. Improving water quality is a fundamental objective of USDA conservation programs and the programs are credited with improving water quality in many watersheds. Ideally, information on reduced nutrient, pesticide, and sediment loadings into rivers, streams, and lakes would be available by year for each practice and program. However, quantifying the improvements that have occurred from conservation efforts is difficult because there are multiple sources of nutrients, sediment, and other pollutants. Additionally, the physical and chemical processes involved are complicated and storage of agricultural chemicals and sediment within a watershed, time lags, and metrological events are all variables requiring careful analysis to identify the consequences of conservation practices. Much of the benefits of soil erosion reduction are increased water quality, as indicated by the estimated benefits of reduced sediment loads under CRP. Water quality benefits can also be attributed to conservation compliance, EQIP, and other programs to the extent they have reduced sediment, nutrient, and pesticide runoff. Swampbuster and WRP also contribute significantly to water quality because wetlands filter sediment and nutrients from the water before it reaches streams or lakes.

USDA is undertaking several efforts to better quantify the effects of conservation on water quality. One such effort, the CEAP, which is a multi-agency effort to monitor, assess, and estimate the effects of conservation practices on cropland, uses NRI sampling and long-term watershed studies to build estimates of water quality responses to conservation.

Air quality. Air quality concerns associated with agricultural production include odors, ozone precursors, ammonia, particulate emissions, and greenhouse gases. Addressing these concerns is an area of increasing emphasis in USDA's conservation programs. Livestock producers enrolled in EQIP can receive cost-share assistance for installing anaerobic waste digesters. These technologies significantly reduce odors associated with large animal feeding operations and, in many cases, can result in significantly lower methane emissions. EQIP also provides farmers with payments to adopt nutrient management practices that reduce nitrogen fertilizer use and thus nitrous oxide emissions and to adopt crop residue management practices that increase the organic content of soils and sequester carbon. The CSP provides enhancement payments for actions that directly benefit air quality, including: improving visibility; reducing near-surface ozone levels; reducing transport of fine and coarse particulates; decreasing livestock-related off-site odor issues; reducing the potential for airborne agricultural chemicals and volatile organic compounds to affect humans; decreasing agriculture's potential contribution to the buildup of greenhouse gases; and increasing the sequestration of carbon on crop, range, and pasture lands. USDA programs encourage farmers and ranchers to adopt practices that remove carbon from the atmosphere and sequester carbon in soil and vegetation. The CRP provides significant carbon sequestration benefits, sequestering more than 13 million metric tons of carbon annually. Wetlands restored by the WRP also sequester substantial amounts of carbon. In addition, EQIP and CSP increase the adoption of conservation tillage and other practices that sequester carbon in cropland soils. In 2003, USDA initiated an effort to target greenhouse gases through conservation programs and estimates that these efforts will result in an additional 12 million metric tons of carbon reductions by 2012.

Key issues for future programs. While indicators, such as erosion reduction and others, suggest environmental improvement is being made, many challenges remain and new issues continue to emerge. For example, excess nutrients impair water quality in many rivers, streams, and lakes, and hypoxia is a problem in the Gulf of Mexico, Chesapeake Bay, and other waters. In addition, conflicts over water availability for agriculture, environmental, and urban use are increasing as water demands increase. As one of the largest water users, agriculture has a vital interest in securing water quality and quantity. Addressing soil erosion has produced major benefits; however, progress may have leveled off, suggesting past strategies may be reaching their limit. An estimated one-third of the 269 million acres of U.S. cropland is eroding at tolerable rates (below "T"), and continues to decline in soil condition and could benefit from management systems that enhance soil organic matter. Invasive species also threaten agricultural profitability in some areas.

Conservation is bringing about important wildlife recoveries, but more can be done, particularly for wetland and aquatic systems and species. Much has also been done to protect farm and forest land from conversion, but as residential and industrial development press into rural

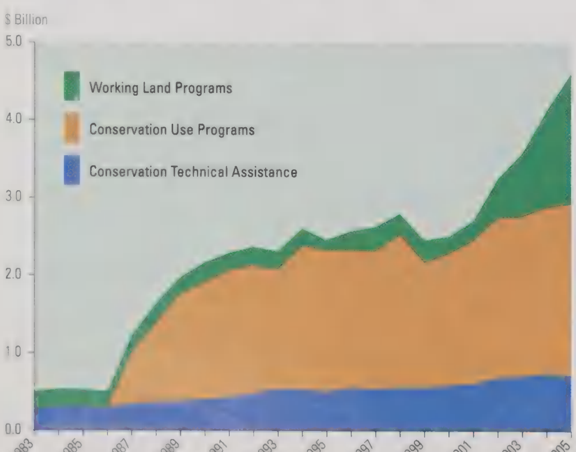
America, more land is at risk, which could have repercussions for rural life, including benefits from recreation and tourism. Another emerging challenge is to better utilize carbon sequestration in agricultural soils as a partial solution to rising greenhouse gas concentrations in the atmosphere. Finally, interest in renewable energy using agricultural lands is rapidly emerging in importance, driven by high oil prices and demand for greater energy supply diversification, creating new conservation dimensions.

Program Costs and Distribution of Program Assistance

The main conclusions related to program spending are: (1) funding for conservation programs has risen sharply under the 2002 Farm Bill, mainly due to expansion of programs on working lands, (2) participation in financial and technical assistance programs is fairly evenly distributed by farm size, (3) payments, relative to the overall size of the farming operation, tend to be much larger for small, rural residence farms (23 percent of gross cash income) than on large, commercial farms (1 percent of gross cash income), and (4) financial assistance varies based on geography, environmental context, and the individual conservation program.

Funding for conservation programs increased sharply following enactment of the 2002 Farm Bill. In FY 2001, Federal funding for USDA's conservation programs, including CTA, was $3.0 billion, with the CRP accounting for $1.7 billion (Figure 5). In FY 2005, funding increased to $4.7 billion with CRP at $1.8 billion. Thus, non-CRP spending accounts for nearly all of the increase, more than doubling over the period, with EQIP and CSP the fastest growing programs. CRP has also shifted toward funding of high-priority, partial field practices, such as grassed waterways and edge-of-field filter strips. These practices support working lands by mitigating damage from agricultural production. About 20 percent of CRP spending is now devoted to these practices through continuous sign-up and CREP.

FIGURE 5. **Conservation Program Spending**



[illegible] Flexible Conservation Measures on Working Land: What Challenges Lie Ahead?

Funding for the 2002 Farm Bill's conservation programs has been an issue since the bill's enactment. Funding for major programs, such as EQIP and CSP, have been reduced below levels authorized by the 2002 Farm Bill to meet overall budget goals.

Because many more small farms participate in conservation programs relative to large farms, the bulk of conservation payments go to smaller farms. In contrast, price and income support program payments are concentrated among larger farms. Smaller farms, however, tend to enroll a larger share of their farming operations in conservation programs, particularly whole-farm enrollment in CRP. Rural residence farms received nearly 60 percent of CRP payments in 2004 but controlled only 20 percent of cropland and 24 percent of overall agricultural land. More research is needed to understand why these farms participate more heavily in CRP. There is some evidence to suggest that larger farms, where the operator's primary occupation is farming, are more likely to participate in working lands programs, including EQIP and CRP continuous sign-up for high-priority buffer practices.

Another issue is distribution of program resources by type of environmental concern. Conservation assistance is difficult to assign to specific environmental concerns because a dollar of assistance may address multiple concerns. However, Table 3 provides some general indications of the level of attention paid to various concerns by program. During 2002-2005, the majority of resources for EQIP, CSP, and CRP, based on the subjectivity of experts' opinions, were focused on water quantity and quality, soils management, and wildlife habitat management. Wetland conservation received less support. The smallest portions of allocated resources were focused on air quality and energy conservation.

Key issues for future programs. Competition for Federal funds suggests there will be a growing need to find more efficient ways to design programs to meet the broad range of conservation needs and to deliver more cost-effective conservation technical assistance. For FY 2005, there were nearly 50,000 unfunded conservation program applications representing $2.4 billion. EQIP, GRP, and WRP account for 93 percent of the applications. While the merits of these unfunded applications are unclear, they nonetheless suggest continuing substantial unmet demand for conservation program participation. Program consolidation and simplification, as well as refining conservation and environmental priority concerns, may increase program efficiency and increase environmental benefits. Energy and air quality are areas of concern receiving the least funding and may merit greater attention in future programs.

The distribution of program participation between rural residence, intermediate, and commercial farms also suggests that movement toward working lands programs could alter the distribution of payments across farm types. If the distribution of conservation program participation shifts toward intermediate and commercial farms, conservation programs may be more effective in addressing some environmental problems such as nutrient runoff, because these farms control a large share of agricultural land and livestock production. It may also mean that the distribution of participation and payments across farms will be less uniform, at least in terms of payments per farm.

Economic and Market Effects

The economic and market effects of conservation programs are also difficult to measure. There may be direct effects on farm income and on commodity markets due to the receipt of a payment if programs induce changes in crop or livestock production. Conservation programs also improve producers' economic performance by providing the technical and financial means to help avoid or minimize potential production and regulatory risks. Conservation measures such as water-conserving irrigation systems can reduce production risk, while comprehensive nutrient manage-

TABLE 3. Estimated Share of Conservation Program Funding Allocated to Environmental Concerns, 2002-2005 [1/]

Program	Water Mgmt	Soil Mgmt	Water Quality	Air Quality	Wetland Conservation	Wildlife Mgmt	Energy	Total
Technical Assistance								
EQIP	28	24	40	2	1	5	—	100
CSP	3	39	45	3	—	6	4	100
CRP	—	24	50	1	5	20	—	100
WRP	2	—	10	—	35	53	—	100
Conservation Technical Assistance	24	38	13	1	6	12	6	100
Financial Assistance (EQIP, GSWC, AMA, WHIP)	31	21	36	2	1	9	—	100
EQIP	28	24	40	2	1	5	—	100
WHIP	1	2	3	1	3	90		100
Easement Programs (WRP, GRP, FRPP)	—	17	9	—	29	45	—	100
Stewardship Programs (CSP, CRP)								
CSP	3	39	45	3	—	6	4	100
CRP	—	34	32	1	7	26	—	100

1/ These estimates are based on individual contract purpose adjusted by program manager expert judgment. The CRP estimates are based on practice and Environmental Benefit Index component scores.

ment plans can help avoid regulatory risk, and grazing land management can reduce risks related to drought and the associated income risk.

Programs that place land in conserving uses, such as the CRP and WRP, have a range of economic, market, and risk reduction impacts. By compensating landowners for placing eligible fragile lands into a long-term conservation cover, participants receive a guaranteed annual income, contributing to income stability and reduced production risk. Moreover, as large amounts of cropland are removed from production, crop production is reduced, increasing crop prices. A 2004 examination of the effect of enrolling an additional 2.8 million acres in the CRP (less than 1 percent of typically planted acreage) estimated crop price increases averaged $0.02 per bushel for wheat, $0.02 for corn, $0.01 to $0.02 for other feed grains, and $0.06 for soybeans. The analysis estimated that an additional 2.8 million acres in the CRP would decrease government costs by a net of $0.2 billion over 2003-12, with commodity program payments reduced by $1.7 billion while CRP payments increased by $1.5 billion over the period. In a freer global market, effects of removing U.S. land from production may be offset to a large degree by increased production in competitor countries.

Local economies may also be affected as additional acreage is enrolled in the CRP. As crop production is reduced, use of inputs such as fertilizer, hired labor, farm equipment, pesticides, and energy decreases. A 2004 congressionally mandated study of the CRP by USDA's Economic Research Service found that the negative effects of the CRP on rural economies tend to be small and transitory. The study did not find impacts on the rural population, government services, or tax burden. One explanation of these results may be that the increase in conservation payments to producers as additional acreage is enrolled in the CRP are invested locally, supporting the rural economy. Agricultural producers and others may also benefit from the provision of environmental goods and services that generate recreation or tourism. The reduction in erosion or greenhouse gas concentrations or the increase in wetland values and functions and wildlife habitat increase environmental quality.

Financial assistance programs on working lands generally provide conservation payments to producers that may not cover the full cost of implementing conservation practices. However, producers may implement conservation practices because, with the conservation payment or know-how from technical assistance, they can meet environmental regulatory requirements, or the environmental and economic benefits the producer receives exceed the costs, or because of their conservation ethic. In some cases, market incentives may be enough for many producers to undertake conservation measures because producers expect the measures alone will result in a positive net return. Research indicates that land degradation causes productivity losses and market incentives are often sufficient to limit productivity-reducing degradation.

Conservation compliance programs require implementation of conservation measures in order to receive farm price and income support payments and other program benefits. While only 39 percent of farms receive government payments, farm price and income support covers over 265 million base acres as well as farms producing milk, sugar, wool and mohair, and other products that do not have base acres. While conservation compliance reduced the effective level of support received by some producers from price and income support programs, research also suggests that it was effective in reducing soil erosion.

Key issues for future programs. Conservation policy needs to balance a variety of concerns ranging from meeting regulatory requirements to farm viability. The economic impacts on individual producers and their communities must be considered along with environmental quality. In a practical sense, this need for balance raises questions about the type of policy tools that are used to encourage better environmental performance on the part of agricultural producers. Programs on working lands or lands put into conservation uses may differ in their economic impact on producers, rural communities, and the environment. Voluntary measures, such as EQIP or CRP, must also be weighed against less voluntary and compulsory actions for improving environmental performance.

Limited work has been done to develop private sector markets for environmental goods and services and use these markets to allocate more efficiently and effectively Federal and private sector funding for conservation programs. The emerging private markets for greenhouse gas offsets and mitigation banks suggest that conservation programs may become more efficient by incorporating activities that use or facilitate environmental market mechanisms, such as

credit trading, mitigation banking, and green labeling and using market mechanisms such as auctions and bidding for more effective implementation.

WTO Implications of Conservation and Environmental Programs

The Uruguay Round Agreement on Agriculture (URAA) of the World Trade Organization (WTO) sets out criteria for classifying domestic farm programs by their level of production and trade distortion. This classification is important because programs that are deemed to be minimally or non-trade distorting (so-called green box) are not subject to annual limits on support, as are programs that are classified as trade-distorting (referred to as amber box). To be classified as minimally or non-trade distorting, a program must meet specific criteria spelled out in the URAA.

To be classified as green box support, a program must meet two sets of criteria. The first are fundamental requirements that the program must be publicly funded, not involve transfers from consumers, and not have the effect of providing price support to producers. In addition to these fundamental requirements, a program has to meet specific policy criteria. Annex 2 to the URAA contains policy-specific green box criteria, several of which are relevant to conservation and environmental programs. The United States already reports to (or "notifies") the WTO several conservation programs under these policy-specific criteria:

- ***Paragraph 2: General services.*** This paragraph covers a wide range of government activities, and several relate to the provision of conservation and environmental services. One is research relating to environmental programs, and another is infrastructural work associated with environmental programs. Support cannot be extended for on-farm facilities or inputs, such as provision of irrigation water. Under this paragraph, the United States has reported to the WTO as green box the Conservation Operations and Resource Conservation and Development programs under NRCS, and payments under Conservation Program Technical Assistance.
- ***Paragraph 6: Decoupled income support.*** To be eligible for green box status, payments must be determined by clearly defined criteria such as income, landowner, use of production inputs, or production level in a defined and fixed base period. Payments cannot be related to any production, prices, or factor of production after the base period. Finally, no production can be required to receive a payment. The United States has not notified any conservation or environmental programs as green box under this paragraph.
- ***Paragraph 10: Structural adjustment provided through resource retirement programs.*** To be eligible for green box status, payments must be part of a well-defined government program that removes land or other resources from marketable agricultural production for a minimum of 3 years (permanently for livestock). Payments shall not require or specify an alternative use for the retired resources that involves the production of marketable agricultural products. The main program notified as green box by the United States in this category has been the Conservation Reserve Program.
- ***Paragraph 12: Payments under environmental programs.*** To be eligible for green box status under this paragraph, payments must be part of a clearly defined government environmental or conservation program and must fulfill specific conditions under the program, including those related to production or inputs. In addition, payments must be limited to the extra costs or loss of income involved in complying with the program. In 2001, the latest year in which the United States notified its programs to the WTO, several conservation programs under this paragraph were notified as green box, including the Agricultural Conservation Program, the Emergency Conservation Program, the Great Plains Conservation Program, the Colorado River Basin Salinity Program, the Wetlands Reserve Program, the Wildlife Habitat Incentives Program, the Farm and Ranch Lands Protection Program, and the Environmental Quality Incentives Program.

Key issues for future programs. Current and future programs should strive for consistency between conservation and environmental programs and WTO green box criteria. Issues in achieving this consistency can be illustrated by examining several USDA programs, including one, CSP, which has not yet been notified to the WTO.

For example, cost-share payments under current conservation programs fit the criteria under Paragraph 12 and are considered to be green box because payments are

limited to less than the full cost of implementing conservation practices. Paragraph 12 does not apply if conservation program payments plus any additional payments provided to producers as an incentive to participate in conservation programs exceed the full cost or loss of income in implementing conservation practices. EQIP's incentive payments relate to increased costs or potential loss of income as a producer adopts a new practice and are consistent with paragraph 12.

The CSP has four separate payments. The stewardship payment, which is the product of the number of acres in each land use category times the payment rate, could also qualify as a decoupled payment under Paragraph 6, recalling that payments cannot be linked to a factor of production after a fixed and defined base period. For the stewardship payment, acres are fixed at a historical level. But if payment rates are adjusted upward over the life of a contract, this feature could be seen as inconsistent with Paragraph 6 criteria. Some CSP enhancement payments may be consistent with paragraph 12 if they reflect costs. However, performance-based enhancement payments may exceed the cost incurred to implement conservation practices. In this instance, such payments would not meet the criteria under Paragraph 12 for a green box program. However, performance-based enhancement payments could meet the paragraph 6 criteria as decoupled income support, provided they are independent of production, price, and factor use.

For programs like CRP in which land is devoted to conserving uses, Paragraph 10 requires that enrolled land must be removed from marketable agricultural production for a minimum of 3 years to be considered a green box program. Some have advocated allowing the production and harvesting of energy crops on land enrolled in the CRP. Such use would have to be reconciled with the criteria contained in Paragraph 10 for a green box program. However, the CRP rental payment could also be viewed as an environmental program payment that compensates for loss of income under paragraph 12.

VI Generalized Alternative Approaches to Current Programs

This section considers four broad alternatives to the existing USDA Farm Bill conservation programs that would address some of the concerns raised in the previous section under "Key issues for future programs." These approaches are not specific farm bill proposals that are being advocated. Neither are they mutually exclusive. Instead, they are presented to help focus further public discussion regarding the 2007 Farm Bill. Each alternative is discussed using the four criteria from Section V.

Conservation programs seek to maintain productive agriculture in harmony with clean air and water, healthy soils, healthy wildlife and fish populations, and sustainable rural communities. Conservation programs arose because tillage increases erosion and reduces soil organic matter; fertilizing crops can increase nutrient runoff and leaching; irrigation limits water available for other uses; and agricultural practices can affect wildlife habitat. Providing landowners with technical assistance and economic incentives to adopt conservation measures can increase environmental benefits.

Although there are many alternative ways to structure programs to increase environmental benefits, implementing conservation-based performance goals could increase program effectiveness. USDA has been developing tools to estimate the effects of conservation practices on nutrient runoff and leaching, greenhouse gas emissions, irrigation water savings, and certain targeted wildlife habitat. These measures could be adapted to provide performance-based conservation program compensation. The CSP has developed performance-based enhancement payments that set payment levels based on a farmer's level of environmental performance as measured by environmental indices.

A performance-based approach to conservation could provide incentives for undertaking greater conservation efforts and a means to measure USDA progress towards meeting broad national conservation priorities. Where possible, addressing these priorities could be measured quantitatively, such as the amount of erosion reduction per year, the decline in nitrogen and phosphorous leaving farms and adversely affecting water quality per year; the increase in

the number of acres of wetlands and buffers per year; the reduction in water use per year; and the increase in named species habitat per year.

Alternative 1: Improve Existing Conservation Programs

Statements made by farmers, ranchers, and the public during the Secretary's Farm Bill Forums indicated stakeholders are generally satisfied with current USDA conservation programs. One of the underlying features of conservation programs—especially the working lands programs—that engenders broad support is the widespread distribution of program participants across the United States. This alternative examines four significant changes that could help improve the effectiveness and efficiency of current USDA conservation programs. The more substantial modifications include: (1) making programs more targeted and increasing the use of market mechanisms; (2) consolidating programs that share common purposes and incentives; (3) rebalancing conservation investments among programs and purposes; and (4) enhancing the support of farm and ranch energy management and development of alternative energy sources.

- ***Increase Environmental Returns on Conservation Investments.*** Increasing environmental returns on Federal conservation program investments requires focusing conservation funding on those locations, such as watersheds or basins, or natural resource problems, such as wetland or habitat losses, that maximize the environmental benefit of Federal investments. A strategy for maximizing the environmental benefit of the Federal investment would need to consider both (1) the way USDA identifies the potential for environmental gain from addressing various resource problems in various locations and (2) the balance between environmental gain and the cost of achieving those gains. A number of strategies could be employed:
  - Adopt a watershed or landscape approach to program delivery, focusing effort on watersheds or landscapes where environmental gains are most likely;
  - Improve program applicant ranking criteria, including replacement of the current regional equity provision with natural-resource-based strategies for allocation of program funds;
  - Make greater use of competitive bidding to lower the cost of conservation program contracts;
  - Use information or indices underlying applicant ranking criteria to vary payments in a way that is commensurate with the potential for environmental benefits, i.e., expand the use of performance-based payments; and
  - Reconsider paying for already implemented practices (stewardship payments) in the overall mix of conservation program tools.
- ***Consolidate Programs and Delivery Mechanisms.*** Consolidation of current cost-share, rental payment, easement purchase, and incentive programs would likely achieve administrative efficiencies as well as improve the effectiveness of program delivery. The current suite of programs could be replaced with a single, streamlined, comprehensive system of financial incentives, supported by technical assistance. Changes to be considered include incorporating the policy tools of conservation-use programs (CRP) and cost-share programs (EQIP, WHIP, and AMA) into a single conservation program and creating a single, multipurpose easement program that would combine WRP, FRPP, and GRP.
- ***Rebalance the Conservation Program Portfolio.*** The 2002 Farm Bill began the process of balancing conservation program funding by increasing the portion of funding allocated for working lands programs, primarily EQIP. Increasingly, CRP has moved away from putting entire fields into conservation uses and toward funding the installation of high-priority "buffer" practices (e.g., filter strips, grassed waterways) that support working lands by reducing the environmental implications of on-going agricultural production. At the beginning of 2006, about 20 percent of CRP funding was devoted to these practices, up from about 10 percent at the beginning of 2002. Even with the 2002 Farm Bill's expanded funding for working lands conservation programs, and changes in CRP funding, over half of USDA conservation payments are devoted to retiring land from commodity production. This modification would continue the trend of increasing the proportion of funding for working lands programs and reducing the proportion for putting land into conservation uses. With the large number of CRP contracts expiring in

2007 and 2008, there may be a unique opportunity to extend benefits on working lands, making additional funding available to a greater number of producers and applicable to a broader array of agricultural lands. In addition, the 39-million-acre cap for CRP may not be appropriate for the longer term given tools available under other conservation programs and concerns about capacity constraints in feedstock production for bioenergy.

- ***Encourage Energy Conservation and Production.*** Many conservation practices not only conserve natural resources, they also save energy. Recent increases in energy prices have significantly affected farm and ranch production costs, This option could add specific energy-conserving practices to financial and technical assistance programs, including authorities and funding for: on-farm energy audits, activities which improve on-farm energy efficiency, and assistance in developing on-farm energy production and bio-energy feedstocks, including allowing, where appropriate, the use of CRP and WRP land intermittently for bioenergy purposes with an accompanying reduction in rental payments.

Conservation and Environmental Benefits. The current allocation of conservation resources to rural areas and across landscapes where there are substantial natural resource problems may not be optimal. More direct consideration of environmental performance and comparison of benefits and costs could possibly improve the effectiveness of current conservation programs.

How program payment and eligibility criteria are structured also affects the efficiency with which these programs deliver environmental gains. Current programs, such as EQIP and CRP, use prospective program costs and environmental benefits to select enrollees. Producer incentives to apply for cost-based payments are roughly the same for everyone and do not depend on the level of environmental benefit a given producer may offer. Thus, cost-based payments are typically used with environmental benefit-cost indices or other targeting devices to ensure that the producers selected for participation can deliver relatively large environmental benefits per dollar of program expenditure. A key question is whether existing environmental benefit-cost indices, such as the Environmental Benefits Index (EBI) used to rank proposed CRP contracts for acceptance in a general signup, can be improved to more accurately reflect the potential benefits and costs of withdrawing land from commodity production.

Unlike EQIP or CRP, CSP bases a large portion of program payments on environmental performance, as measured by environmental indices. The key advantage of this approach is that producers who can deliver environmental benefits, especially those who can do so at a low cost, have a larger participation incentive. Some producers, who can deliver substantial environmental benefits but would not sign up for an environmental program that only reimburses the cost (or a portion of the cost) may be induced to sign up for a performance-based payment. On the downside, these incentives could increase the cost of achieving environmental gains, to the extent that payments exceed cost. Thus, programs with cost-based or bid-based payments (e.g., EQIP and CRP) may deliver more environmental gain per dollar of Federal investment, even without enrolling some producers who could deliver significant benefits. Performance-based payments must also be carefully designed to limit distortions of production incentives. If payments are too large, they may encourage the expansion of crop production onto marginal land.

With EQIP, the 2002 Farm Bill prohibited "bidding down" of the cost share out of concern that economies of size would result in most funds going to large farms that could agree to undertake conservation practices at lower costs. On the other hand, the use of auctions and bidding for at least a portion of the programs could stretch program dollars by encouraging producers to reveal the minimum payment they would be willing to accept for retiring land or installing conservation practices.

Finally, payments for prior implementation of conservation measures, such as so-called "good actor" payments, may help maintain conservation measures but can be costly with limited additional environmental benefit. Current programs focusing on land in agricultural production provide such payments as only a small portion of total program payments, such as the CSP stewardship payment. Analysis indicates more conservation benefits per dollar spent may be obtained by basing payments on performance targets rather than past actions or specific practices. Rebalancing the CSP funding between stewardship payments and enhancement payments could increase environmental benefits by encouraging additional new conservation actions on the part of producers.

Creating a single financial assistance conservation program would allow the program implementation process, which is sensitive to local conservation needs, to allocate funding to those conservation purposes and mechanisms that can create the greatest environmental benefit. A single program with expanded authorities for conservation performance payments has the potential to enhance the level of conservation and create new, innovative approaches to conservation. If the balance between rental programs and working lands programs changed toward working lands, some land now in conserving uses could be brought into commodity production. More land in working lands programs may bring fragile land into production that would not otherwise be there. While working lands conservation program tools could preserve many environmental benefits, some benefits on these lands, such as wildlife habitat, would be reduced, lost, or changed with respect to the species benefiting.

Program Costs and Distribution of Program Assistance. With competition for Federal funding, implementing the modifications in this alternative would likely enable the programs to operate with greater efficiency and thus stretch program dollars to achieve conservation objectives.

Taken as a whole, conservation participation and payments—on a per-farm basis—are relatively evenly distributed across the country and across farm size, farm type, and farm income level. The EQIP and CSP programs are somewhat uniform in their geographic distribution, and to the extent that the above modifications shift funding from rental and easement programs toward working lands programs, conservation program distribution would likely be made more geographically uniform. However, environmental concerns are not necessarily spread evenly geographically. Thus, program distribution under performance-based conservation programs tied to environmental goals would reflect areas of greatest resource concern.

Economic and Market Impacts. The financial assistance and easement programs are widely dispersed across the Nation and tend to have nominal impacts on local economies. The above modifications would not likely have commodity market effects significantly different from current programs, unless the balance between rental programs and working lands programs changed sharply. Land brought back into production would increase the demand for farm-related goods and services leading to job growth in farm support service industries and marginally increase agricultural production. However, if recreational opportunities are reduced, then there could be an off-setting reduction in recreation-oriented enterprises. Expanding the GRP could be one option for providing incentives to keep expiring CRP land in grass and thereby mitigate any potential losses in recreational opportunities. This land could also shift directly to the CSP with cost share available to add fencing and livestock water.

Many of the conservation practices supported by USDA conservation programs conserve the use of fossil fuel-based inputs like diesel fuel, nitrogen, and electricity. In addition, there are programs that support bio-energy production like EQIP, CSP, and CRP. Expansion of these program initiatives could contribute to farm profitability and rural economies while providing environmental benefits.

WTO Implications. The changes under this alternative would employ the current suite of conservation program tools but in different ways. Thus, the programs are expected to be consistent with WTO obligations for green box programs. Two concerns are expanded energy production and greater use of enhancement payments. Care must be taken to ensure energy incentives are not coupled payments that are tied to production, price, or input use of energy crops. Enhancement payments must compensate only for costs incurred or income foregone or qualify as decoupled income support, an issue discussed in more detail in the next alternative.

Alternative 2: Provide "green payments" to enhance environmental benefits and provide income support.

Many Farm Bill Forum participants were interested in programs that would reward producers for environmental performance. These so-called green payment programs have been touted by some as an alternative way to provide income support to producers in a manner that is consistent with WTO domestic support constraints, while providing substantial environmental benefits.

There are numerous approaches to providing green payments for income support. One approach would be incentive payments to producers to undertake a broad

range of conservation practices. Another approach would be performance-based payments, which would be commensurate with the environmental benefit of adopting and maintaining appropriate conservation practices, not the cost of installing or adopting the practices. In effect, the Government would create a market for environmental gain, and producers would decide whether to produce those gains in much the same way as they decide to produce commodities: if the payment they receive exceeds the costs of their conservation activities, producers would make a profit, or have their income supported, by "producing" environmental gain. To support incomes of most producers, including those currently receiving price and income support payments, most cropland and grazing land could be made eligible to participate.

Conservation and Environmental Benefits. The environmental impact of green payments would depend largely on the program structure, and in particular, the degree to which a payment is tied to environmental performance. Enhancement payments, with their focus on the potential for environmental gain, could increase environmental benefits by encouraging additional new conservation actions by producers. However, if payments are structured largely for income support (albeit with the condition that recipients must meet some environmental standards), a given level of conservation program funding is likely to produce less environmental gain.

Program Costs and Distribution of Program Assistance. If stewardship payments were focused on current recipients of farm income support, as, for example, through expanded conservation compliance or other criteria, the payments would likely not address the same environmental issues or direct funds to the same producers as current conservation payments. For example, in 2003, only 43 percent of conservation payments went to farms that also received commodity payments. If commodity payments were to serve as the basis of a new green payment program, environmental benefits would focus more heavily on resource concerns related to crop production and less on resource concerns related to livestock producers.

By contrast, current conservation payments tend to be more broadly available to nonprogram crop and livestock producers. If green payments were focused on current recipients of conservation payments, producers of nonprogram crops and livestock producers would likely gain, perhaps at the expense of current program crop producers. Green payments funded from reductions in spending from current commodity programs could also have negative implications for asset values of current commodity program beneficiaries and may jeopardize the accomplishments of conservation compliance.

Economic and Market Impacts. While this alternative is an appealing approach on many levels, caution is in order. When environmental gain is equated with the application of certain practices through the use of an environmental benefit index or other means of estimation, producers may be encouraged to bring additional marginal land into production, possibly offsetting environmental gains. Unfortunately, it is not yet possible to monitor the conservation performance of a specific farm at a reasonable cost. Safeguards against expanding production would be needed.

Nearly every farm faces some type of environmental concern. However, unless payments are targeted to increased environmental performance, the marginal costs of increasing environmental benefits through green payments may be high. Performance-based payments could be more cost-efficient at providing environmental benefits than payments tied to practices or prior actions. For example, a practice-based program that pays out regardless of location or other field characteristics could be funding many practices of marginal environmental benefit.

WTO Implications. Another caution with this alternative is the inherent tension between the objectives of using green payments as income support and using them to produce environmental benefits as evidenced by examining the consistency of green payments with WTO criteria. If conservation payments only compensate producers for cost or income foregone, and are consistent with Annex 2 (the Understanding on Rules and Procedures Governing the Settlement of Disputes), paragraph 12, then there is no income support. If the payments are for environmental benefits but exceed the producer's costs or income foregone, then to be green box, the payments must be decoupled income support and consistent with Annex 2 paragraph 6. However, to be decoupled income support, the payments must not be related to input use, and it is often by changing input use that conservation payments

achieve environmental gains. Thus, if the conservation practices undertaken by the producer are restricted to ensure WTO consistency, the environmental gains may be limited. A conservation program that enhances net farm income, is environmentally effective, and is green box for WTO purposes would be a challenge to design and require careful development.

A green payment program is not necessarily green box and thus exempt from reduction commitments in the context of the WTO. For example, to the extent conservation payments exceed the cost of implementing environmental practices, such payments are ineligible for inclusion under paragraph 12, environmental payments. However, such payments may still be consistent with paragraph 6 criteria as decoupled direct support, provided the payments are not linked to current prices, production, or input use.

Alternative 3: Encourage Private Sector Markets for Environmental Services

There is increasing interest in the role agriculture and forestry practices can play in providing environmental goods and services to private sector markets. New private sector environmental markets could complement or in some cases potentially replace existing federally supported conservation efforts. Environmental markets offer an alternative way to achieve the goals of traditional environmental regulations. For example, industrial firms could meet regulatory obligations by purchasing pollution abatement services (offsets) from lower cost providers and achieve pollution reductions at lower cost to society. Environmental markets offer financial opportunities for agricultural producers and landowners. Agricultural operations that are subject to environmental regulations could benefit from the improved efficiency provided by environmental markets, and earn income by providing offsets in cases where they are either not subject to regulatory requirements or can exceed the required environmental performance.

Agriculture and forestry can be low-cost providers of a number of environmental goods and services. Environmental markets with relevance to agriculture and forestry include: water quality, air quality, wetlands, endangered species, greenhouse gases, and development rights. Private environmental markets could supplement Federal efforts for conservation and environmental protection, allowing Federal funds to reach more farms. To accomplish this, Federal conservation programs would need to contain provisions that allow private and federal funds to complement each other. First, programs need to allow the private sale of environmental credits produced as a result of Federal support (this is currently permissible under EQIP and CRP and under WRP in some instances). Second, the programs would need to be structured to foster competition so that farmers receiving revenue from private environmental markets would have an incentive to reduce requests for Federal aid.

The ability of agriculture and forestry to provide environmental credits has been hampered by several barriers, including: high transaction costs, the small quantity of benefits that can be provided by individual farmers or landowners, performance risks and liability, a lack of information, and uncertainties in quantifying benefits. New authorities could possibly enable USDA to overcome these barriers and promote the establishment of environmental markets for agricultural and forestry conservation activities. It is likely that development of these markets would take time.

- ***Establish Market Confidence and Validity:*** Generating substantial demand for environmental goods and services hinges on the ability to use environmental credits to offset regulatory requirements. Congress could authorize USDA and Federal regulatory agencies to cooperate to ensure that environmental goods produced by agriculture can be used to offset their regulatory requirements in other sectors.
- ***Develop Uniform Standards:*** Environmental markets require standard units of environmental benefits. USDA could be authorized to develop consistent standards for estimating environmental goods and services provided by agriculture and forestry. Uniform rules, including standards for data quality, verification, reporting, and estimation methods, could help ensure credible and fair ecosystem service markets.

- *Foster Emerging Markets:* USDA could be authorized to provide investment capital, such as loans and grants, to stimulate markets. Funds could be used for projects and to support States, cooperatives, and others that could work to address barriers such as risk, liability, lack of information, and scale of benefits.

Conservation and Environmental Benefits. Traditional environmental regulations require firms to reduce pollution to a set level or to install specific technologies and practices. While fairly straightforward, this approach can be costly both to the firms and to society because firms with high costs of pollution reduction and those with low costs are required to meet the same requirements, which may waste resources. Private sector environmental markets can offer efficiency improvements over traditional regulations and could result in overall increases in environmental and conservation benefits. For example, a firm that is a point source of water pollution could pay a farmer to establish buffer strips to reduce nutrient runoff. These buffer strips would also sequester carbon and provide wildlife habitat.

Program Costs and Distribution of Benefits. The Federal costs of promoting private sector environmental markets may be less than the costs of direct payments and cost-sharing. Federal costs would be limited to the costs associated with rule-making, research and development of methods for quantifying benefits, and investments in activities to foster emerging markets. The private sector would bear the major costs of implementing actions. Moreover, the costs to firms of purchasing environmental benefits under market systems would be lower than their costs under traditional command-and-control approaches.

The distribution of benefits would be driven by market forces. The distribution of benefits would also vary by the type of environmental market—reflecting differences in the underlying environmental goals and objectives. For example, water quality goals are specific and localized within watersheds and, in some cases, localized to particular points within watersheds. The value of the offsets would be tied to the location of the action.

The case of regional or global air pollutants provides greater flexibility. Effective markets can exist based on the average benefits provided by actions. The estimates may over- or under-estimate the benefits of a specific action or at a specific location. However, if the estimates are unbiased in their structure and application, they should reflect the benefits when aggregated at a larger scale. Benefits in regional and global air pollutant environmental markets would tend to accrue in regions that can provide low-cost offsets.

Economic and Market Effects. The application of environmental markets to agriculture could provide economic and environmental benefits to the sector. The cost of providing environmental services, such as improved water quality, reduced air pollution, and carbon sequestration, are often lower in agriculture than in other sectors. As a consequence, the implementation of environmental markets could result in increases in the actions to improve environmental quality and an influx of revenue from sectors with high environmental compliance costs.

The magnitude of these benefits would vary depending on the type of environmental good or service. For example, wetland mitigation banks have been set up in many States to allow private developers to purchase wetland conversion rights from farmers who have established or restored wetlands. The prices of wetlands banked depend on location, establishment costs, and/or expected environmental benefits. For example, in Minnesota, wetland credits to public transportation authorities ranged from $4,000 to $35,000 per acre, depending on proximity to the Twin Cities metro area.

In cases where controls are not costly or regulations are not binding, the value of offsets is often low. Private markets for greenhouse gas reductions have emerged in the absence of regulatory requirements in the United States. The value of greenhouse gas reductions in these voluntary markets is low, on the order of $1 to $2 per ton of carbon dioxide.

WTO Implications. Market mechanisms are largely private sector transfers and should have negligible implications for WTO compliance. Ultimately, whether a program that involves any payments to producers is consistent with Annex 2 criteria will depend on whether payments exceed costs incurred or income foregone from implementing a particular practice (as in Annex 2, paragraph 12) or whether payments are tied to current production, prices, or input use (as in Annex 2, paragraph 6).

Alternative 4: Expand Conservation Compliance or Establish a Standard of Care

A way to strengthen the linkage between price and income support and conservation is to expand conservation compliance requirements. The effectiveness and enforceability of compliance mechanisms in achieving environmental gains, compared with a conservation payment program, would depend on the size and distribution of other types of USDA payments. The experience with current conservation compliance provisions is that the estimated level of farm program payments per acre of HEL cropland varies widely across farms, as do compliance costs.

With price and income support programs centered on major field crops, environmental problems associated with cropland are likely candidates for compliance. For example, the overlap between farm program payments and areas with a high potential for nitrogen runoff would yield significant benefits if compliance requirements included some aspect of nutrient management.

One option is to recast the current compliance provisions and incorporate a "standard of care" approach to managing natural resources. For example, the standard of care could be the same as the conservation requirements associated with CSP Tier I eligibility, which require the producer to address soil and water quality to a minimum level of treatment on part of the farm. The advantage of this approach would be that there are existing tools available to determine compliance and these standards already have acceptance as eligibility criteria in the CSP program. USDA program participants would be required to meet the standard of care in order to continue to receive price and income support. Or, program participants could be required to reduce erosion on all land, not just HEL. Such approaches move farm program payments in the direction of green payments as discussed in Alternative 2.

Compliance could be expanded not only in terms of environmental requirements but also by linkage to other USDA programs and the extent of land covered by compliance provisions. Linkages to other USDA programs could be expanded several ways, such as linking disaster payment eligibility to implementation of a conservation system that meets some minimum level of treatment or standard of care, or creating a sliding scale of commodity payments based on the level of conservation treatment, or prohibiting producers who bring certain grasslands into crop production from obtaining subsidized crop insurance for some period.

Conservation and Environmental Benefits. The erosion reductions under conservation compliance suggest that extending HEL compliance provisions to non-HEL could produce additional on-site and off-site environmental benefits. Incorporating additional criteria for the receipt of farm program benefits, such as CSP Tier I, would add to conservation benefits. For example, there are indications that non-HEL grassland is being converted to cropland in the prairie pothole region and adversely affecting critical duck habitat. Expanding sodbusting compliance provisions to non-HEL land could help protect this habitat. Additional water quality benefits could be obtained by adding some aspect of nutrient management in crop production to the list of compliance requirements.

Program Costs and Distribution of Program Assistance. One of the advantages of compliance programs is that they do not require additional program funding other than technical assistance to help farmers comply with the requirements of the compliance provision. However, technical assistance costs could be high and farmers would likely incur costs that are not offset by cost-share programs like EQIP. Moreover, these costs are not likely to be evenly distributed across producers. Expanding compliance beyond highly erodible land and wetlands by incorporating a standard of care for soil quality and water quality may substantially alter the distribution of farm types and increase the number of farms and acres affected by conservation compliance. Also, if farm program benefits were reduced in the future, there would be less incentive for producers to expand or maintain existing conservation practices to comply with conservation compliance.

Economic and Market Impacts. Properly designed, the economic and market impacts of expanded conservation compliance could be limited. A key element in minimizing the effects is the availability of cost-effective technology that can not only help farmers comply with the compliance provisions, but also reduce their production costs, reduce weather related risks, or enhance yields. To minimize adverse economic impacts to farmers and ranchers, a significant phase-in period would be needed, much like the

1985 compliance provisions. This would allow time for enterprise changes, timely equipment purchases, the development of technology, and would help stimulate innovation on the part of agri-businesses.

WTO Implications. Expanded conservation compliance requirements as a condition for receiving program payments does not raise any specific issue relating to WTO rules. To maintain a payment's green box status, linkage between a compliance requirement and a payment must not be tied to current price, production, or input use. But, compliance provisions, however useful for improving environmental benefits, cannot turn an amber box payment into a green box payment.

VII Suggestions for Further Reading

The following is a list of selected USDA publications related to the issues raised in this paper.

Aillery, Marcel. *Contrasting Working-Land and Land Retirement Programs*. Economic Research Service, USDA, Economic Brief No. (EB4) 6 pp, March 2006. **http://www.ers.usda.gov/Publications/EB4/**

Cattaneo, Andrea, Roger Claassen, Robert Johansson, and Marca Weinberg. *Flexible Conservation Measures on Working Land: What Challenges Lie Ahead?* Economic Research Service, USDA, Economic Research Report No. (ERR5) 79 pp, June 2005. **http://www.ers.usda.gov/publications/ERR5/**

Claassen, Roger, LeRoy Hansen, Mark Peters, Vince Breneman, Marca Weinberg, Andrea Cattaneo, Peter Feather, Dwight Gadsby, Daniel Hellerstein, Jeff Hopkins, Paul Johnston, Mitch Morehart, Mark Smith. *Agri-Environmental Policy at the Crossroads: Guideposts on a Changing Landscape.* Economic Research Service, USDA, Agricultural Economic Report No. (AER794) 72 pp, January 2001. **http://www.ers.usda.gov/Publications/aer794/**

Claasen, Roger and Mitch Morehart. *Greening Income Support and Supporting Green,* Economic Research Service, USDA, Economic Brief No. (EB1) 6 pp, March 2006. **http://www.ers.usda.gov/Publications/EB1/**

Claassen, Roger, Vince Breneman, Shawn Bucholtz, Andrea Cattaneo, Robert Johansson, and Mitch Morehart. *Environmental Compliance in U.S. Agricultural Policy: Past Performance and Future Potential.* Economic Research Service, USDA, Agricultural Economic Report No. (AER832) 52 pp, May 2004. **http://www.ers.usda.gov/Publications/aer832/**

Hansen, LeRoy and Daniel Hellerstein. *Better Targeting, Better Outcomes.* Economic Research Service, USDA, Economic Brief No. (EB2) 6 pp, March 2006. **http://www.ers.usda.gov/Publications/EB2/**

Johansson, Robert. *Participant Bidding Enhances Cost Effectiveness.* Economic Research Service, USDA, Economic Brief No. (EB3) 6 pp, March 2006. **http://www.ers.usda.gov/Publications/EB3/**

Lambert, Dayton, Patrick Sullivan, Roger Claassen, and Linda Foreman. *Conservation-Compatible Practices and Programs:* Who Participates? Economic Research Service, USDA, Economic Research Report No. (ERR14) 48 pp, February 2006. **http://www.ers.usda.gov/Publications/err14/**

Sullivan, Patrick, Daniel Hellerstein, LeRoy Hansen, Robert Johansson, Steven Koening, Ruben Lubowski, William McBride, David McGranahan, Michael Roberts, Stephen Vogel, and Shawn Bucholtz. *The Conservation Reserve Program: Economic Implications for Rural America.* Agricultural Economic Report No. (AER 834) 106 pp, September 2004. **http://www.ers.usda.gov/Publications/aer834/**

Sullivan, Patrick, Daniel Hellerstein, David McGranahan, and Stephen Vogel. "Farmland Retirement's Impact on Rural Growth." *Amber Waves.* November 2004. Economic Research Service, USDA

Weinberg, Marca and Roger Claassen. *Rewarding Farm Practices versus Environmental Performance.* Economic Brief No. (EB5) 6 pp, March 2006. **http://www.ers.usda.gov/Publications/EB5/**

APPENDIX TABLE 1. Policy Tools for Addressing Environmental Effects of Agriculture

POLICY	PARTICIPATION	GOVERNMENT ROLE	REPRESENTATIVE PROGRAMS	
			Program title	*Acronym*
Education/ Technical Assistance	Voluntary	Provide farmers with information and training to plan and implement practices	Conservation Technical Assistance	CTA
Economic Incentives: Place Cropland in Conserving Use	Voluntary	Annual payments for placing cropland in conserving uses for contract duration or long-term easements; contracts generally long term (10 years – permanent)	Conservation Reserve Program – General Signup Wetland Reserve Program and	CRP WRP
Economic Incentives: Working Lands	Voluntary	Payments to offset the cost of adopting specified management structural practices; contracts are for 1-10 years	Environmental Quality Incentives Program Conservation Security Program Wildlife Habitat Incentives Program Conservation Reserve Program – Continuous signup Conservation Reserve Enhancement Program	EQIP CSP WHIP None CREP
Economic Incentive: Agricultural land preservation	Voluntary	Purchase of easement on developments rights	Farm and Ranchland Protection Program	FRPP
Compliance Mechanisms	Involuntary, after opt-in to Farm Program	Sets standards for environmental performance and determines whether requirements are met before releasing payments	Conservation Compliance Sodbuster Swampbuster	None None None
Regulatory Requirements	Involuntary	Large livestock subject to permit requirements	Clean Water Act	CWA
		Use restrictions and bans on certain pesticides	Federal Insecticide, Fungicide and Rodenticide Act	FIFRA
		Farmers may not "take" a member of a listed species; Agencies must protect and restore species and their habitats	Endangered Species Act	ESA

APPENDIX TABLE 2. Summary of USDA Conservation Programs

PROGRAM	PURPOSE/ PRIORITIES	ELIGIBILITY	POLICY TOOLS		
			Technical & Education Assistance	*Economic Incentives*	*Compliance [opt-in to Farm Program]*
Agricultural Management Assistance Program (AMA)	Water management, water quality, and erosion control and mitigate risk through production diversification or resource conservation practices, including transition to organic farming. Priorities include: 1) Reduce nonpoint source pollution in impaired watersheds consistent with Total Daily Maximum Loads (TMDLs), where available, as well as the reduction of groundwater contamination; 2) Promote conservation of ground and surface water resources; 3) Reduce emissions that contribute to air quality impairment violations of National Ambient Air Quality Standards; 4) Reduce soil erosion and sedimentation; 5) Promote at-risk species habitat conservation.		✓	✓ incentive, cost share	✓
Conservation Reserve Program – General Signup (CRP)	Retires land from crop production to provide specific environmental benefits. Priorities include soil erosion control, water quality, air quality, and wildlife.	Owners/ operators for at least 1 year and control during contract period	✓	✓ cost-share, rental	✓
Conservation Reserve Program – Continuous signup (CCRP)	Installs certain conservation practices that provide large benefits (such as riparian buffers and grass filters, bottomland hardwood reforestation, and wetland restoration)	Owners/ operators for at least 1 year and control during contract period	✓	✓ incentive, cost-share, rental	✓
Conservation Reserve Enhancement Program (CREP)	Specific conservation needs as defined by State and Federal partnership (such as sediment, and nutrient containing runoff into the Chesapeake Bay, the Everglades, and the Illinois, Ohio, and Minnesota River watersheds)	Owners/ operators for at least 1 year and control during contract period	✓	✓ cost-share, easement, rental	✓
CRP Farmable Wetlands Program	Retires small wetlands on cropland to provide wildlife benefits	Owners/ operators for at least 1 year and control during contract period	✓	✓ rental	✓
Conservation Security Program (CSP)	Promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes. Meeting minimum standards for water quality and soil quality as basic eligibility requirements	Privately owned & tribal land; agricultural producers	✓	✓ stewardship, enhancement	✓
Environmental Quality Incentives Program (EQIP)	Foster adoption of specified management and structural measures to address specific resource quality problems. National priorities include erosion, at-risk species habitat, air quality, water quality and conservation, and State and local resource concerns.	Agricultural producers	✓	✓ incentive, cost-share	✓

APPENDIX TABLE 2. Summary of USDA Conservation Programs

PROGRAM	PURPOSE / PRIORITIES	ELIGIBILITY	POLICY TOOLS		
			Technical & Education Assistance	*Economic Incentives*	*Compliance [opt-in to Farm Program]*
Ground and Surface Water Conservation (GSWC)	Conserve ground and surface water on agricultural operations	Agricultural producers	✓	✓ incentive, cost-share	✓
Klamath Basin (KB)	Conservation planning and on-farm conservation implementation in California and Oregon	Agricultural producers in Klamath Basin	✓	✓ incentive, cost-share	✓
Conservation Innovation Grants (CIG)	Stimulate development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection	Non-Federal Government or non-government organizations, Tribes, or individuals		✓	
Farm and Ranch Land Protection Program (FRPP)	Protect important farm and ranchland from conversion and retain in agricultural uses. Resource concerns include: soils of prime, unique, locally important or statewide significance or land with significant archeological or historic resources.	Landowners who apply and cooperating entities	✓	✓ easement	✓
Grassland Reserve Program (GRP)	Conserve vulnerable grasslands from conversion to other uses and conserve valuable grasslands by helping maintain viable ranching operations. Resource concerns include: animal and plant populations of significant ecological value, grazing land health.	Easements – privately owned & tribal grasslands; Contracts – owners with long-term control of land		✓ easement, rental	
Healthy Forest Reserve Program (HFRP)	Restore and enhance forest ecosystems to: 1) promote the recovery of threatened and endangered species, 2) improve biodiversity; and 3) enhance carbon sequestration.			✓ easement	
Wetland Reserve Program (WRP)	Restore and protect wetlands and associated upland resources, and the plant and animal populations they support; contribute to improved water supply and quality; and mitigate flooding.	Owners of restored or restorable wetlands and uplands for at least 1 year	✓	✓ cost-share, rental, easement	✓
Wildlife Habitat Incentives Program (WHIP)	Establish and improve fish and wildlife habitat. Priorities include: Promote the restoration of declining or important native wildlife habitats; Protect, restore, develop or enhance wildlife habitat of at-risk species (candidate species, and State and Federally listed threatened and endangered species); Reduce the impacts of invasive species on wildlife habitats; and Protect, restore, develop or enhance declining or important aquatic wildlife species' habitats.	Individuals, groups, entities, non-government organizations, Tribe, non-Federal Government	✓	✓ cost-share	✓

APPENDIX TABLE 2. Summary of USDA Conservation Programs

PROGRAM	PURPOSE / PRIORITIES	ELIGIBILITY	POLICY TOOLS		
			Technical & Education Assistance	*Economic Incentives*	*Compliance [opt-in to Farm Program]*
Conservation Technical Assistance (CTA)	Technical assistance for conservation planning, design, and implementation; technology development and transfer; resource inventory and assessment; conservation compliance activities. National priorities include: 1) CNMP planning to assist animal feeding operation owners and operators to address their conservation needs, and where appropriate to comply under the EPA's Concentrated Animal Feeding Operation rule; 2) Reduce nonpoint source pollution in impaired watersheds consistent with TMDLs where available and reduce groundwater contamination and point sources contamination from confined animal feeding operations; 3) Conserve ground and surface water resources; 4) Reduce emissions that contribute to air quality impairment violations of National Ambient Air Quality Standards; 5) Reduce soil erosion and sedimentation; and 6) Promote at-risk species habitat conservation.	All non-Federal lands	✓		✓
Cooperative Conservation Partnerships Initiative (CCPI)	Conservation priorities in watersheds and airsheds of special significance	State and local governments and agencies; Indian Tribes; and non-governmental organizations that have a history of working with agricultural producers		✓ cost-share	
National Resources Inventory (NRI)	Statistically reliable data and information on natural resource status and trends on non-Federal lands to support policy, planning, and program development and implementation		✓		
Emergency Watershed Protection (EWP)	Emergency response to watershed impairments from fire, flood or other natural occurrence; prevent development in vulnerable flood plains		✓	✓ cost-share, easement	
Emergency Conservation Program (ECP)	Emergency response to rehabilitate farmland damaged by wind erosion, floods, hurricanes, or other natural disasters; emergency water conservation measures during severe drought		✓	cost-share	
Flood Prevention Operations (WF-03)	Watershed improvement measures to reduce flood, sedimentation, and erosion damages; further the conservation, development, utilization, and disposal of water; and conservation and proper land use		✓	✓ cost share	
Resource Conservation and Development (RC&D)	Conservation, development and utilization of natural resources to improve the general level of economic activity, and to enhance the environment and standard of living in designated RC&D areas		✓	✓ [cost share authority?]	

APPENDIX TABLE 2. Summary of USDA Conservation Programs

PROGRAM	PURPOSE / PRIORITIES	ELIGIBILITY	POLICY TOOLS		
			Technical & Education Assistance	*Economic Incentives*	*Compliance [opt-in to Farm Program]*
Watershed Surveys and Planning (PL-566)	Investigations and surveys of river basins with other Federal, State, and local agencies as a basis for the development of coordinated water resource programs, floodplain management studies, and flood insurance studies; assists public sponsors to develop watershed plans to mitigate flood damages; conservation, development, utilization and disposal of water; and conservation and proper land use		✓		
Watershed Rehabilitation Program (REHAB)	Rehabilitate dams critical to ensure community public health and safety		✓	✓ cost share	
Watershed Operations (PL-534)	Implement authorized watershed project plans through local sponsoring entities for the purpose of watershed protection; flood mitigation; water quality improvements; soil erosion reduction; rural, municipal and industrial water supply; irrigation water management; sediment control; fish and wildlife enhancement; and wetlands and wetland function creation and restoration		✓	✓ cost share	
Forest Inventory and Analysis (FIA)	Statistically reliable data and information on forest resource status and trends on Federal and non-Federal lands		✓		
Plant Materials	Native plants to address specific natural resource problems		✓		
Snow Survey and Water Forecasting	Information on Western States and Alaska water supplies to support decisions on agricultural production, fish and wildlife management, municipal and industrial water supply, urban development, flood control, recreation power generation, and water quality		✓		
Soil Survey	Soil information necessary for understanding, managing, conserving and sustaining the Nation's soil resources		✓		

APPENDIX TABLE 3. Conservation Payments by Program, Estimated Calendar Year 2005 ($1,000)

State	CRP	WRP	EQIP	CSP	Emergency Conservation	Emergency Protection	Other	Total Payments
Alabama	22,474	22	7,143	941	7,764	338	300	38,982
Alaska	991	23	1,178	12	0	0	245	2,448
Arizona	0	3	8,803	243	419	135	78	9,680
Arkansas	12,811	14,149	10,065	15,620	499	0	366	53,509
California	4,513	10,367	27,285	7,348	1,837	2,341	715	54,406
Colorado	72,906	2,068	17,135	2,634	615	3,239	520	99,118
Connecticut	27	30	1,530	3	11	1,945	252	3,798
Delaware	810	0	3,727	501	0	2,293	418	7,750
Florida	2,661	1,256	5,395	551	15,527	850	322	26,563
Georgia	12,127	624	7,227	3,893	7,784	0	340	31,996
Hawaii	4	61	789	91	621	0	512	2,078
Idaho	31,506	263	8,882	5,204	80	403	260	46,598
Illinois	120,265	9,523	6,107	9,420	68	0	197	145,579
Indiana	42,816	11,242	5,343	7,328	185	999	267	68,180
Iowa	217,543	13,320	13,064	18,651	1,093	0	390	264,061
Kansas	116,004	776	14,763	10,108	15	468	542	142,676
Kentucky	30,396	3,631	7,624	532	171	2,846	210	45,410
Louisiana	15,145	5,877	7,802	488	1,609	0	511	31,432
Maine	1,205	28	3,967	37	25	674	729	6,665
Maryland	10,784	211	2,152	5,132	3	4,290	538	23,110
Massachusetts	14	180	1,506	35	16	3,556	515	5,823
Michigan	20,759	5,748	6,450	6,859	56	1,829	202	41,904
Minnesota	110,631	15,440	14,764	5,688	225	0	367	147,115
Mississippi	42,561	7,435	12,876	538	1,201	0	775	65,385
Missouri	105,354	10,519	9,184	19,092	1,655	0	605	146,409
Montana	113,501	455	15,681	11,249	681	800	257	142,624
Nebraska	71,264	4,437	20,254	7,071	477	211	483	104,196
Nevada	3	3	2,147	813	1,047	0	424	4,437
New Hampshire	11	111	1,340	67	0	3,819	161	5,508
New Jersey	139	4,456	1,768	75	809	4,707	284	12,237
New Mexico	19,209	420	12,168	1,789	192	1,516	175	35,469
New York	4,777	1,761	3,991	1,278	1,308	1,771	1,032	15,918
North Carolina	8,600	3,249	10,450	1,857	5,730	1,320	141	31,347
North Dakota	110,029	2,141	10,088	5,685	3	438	336	128,720
Ohio	36,095	3,123	6,828	8,694	1,492	1,954	361	58,548
Oklahoma	33,622	3,803	10,936	1,802	49	288	544	51,045
Oregon	30,340	6,649	13,023	23,152	250	0	548	73,963
Pennsylvania	23,369	53	6,274	1,442	719	2,051	704	34,610
Rhode Island	2	52	1,002	13	0	2,862	410	4,340
South Carolina	8,054	5,207	4,152	2,121	645	2,396	325	22,901
South Dakota	67,235	516	10,484	785	3,796	0	884	83,700
Tennessee	16,880	1,592	5,972	132	237	870	351	26,034
Texas	140,449	614	47,810	2,350	238	1,529	424	193,414
Utah	6,170	108	11,661	1,624	590	0	542	20,694
Vermont	460	15	2,648	122	21	1,304	732	5,304
Virginia	6,350	190	5,849	1,358	2,607	879	288	17,521
Washington	78,574	2,998	9,751	6,420	1,889	1,159	357	101,148
West Virginia	693	12	2,788	21	632	784	447	5,377
Wisconsin	44,452	5,865	11,677	4,214	0	0	334	66,540
Wyoming	8,092	62	10,426	972	586	55,580	992	76,710
United States	**1,822,680**	**160,682**	**443,929**	**206,053**	**65,478**	**112,442**	**21,711**	**2,832,975**

3 Rural Development

I Introduction

This paper is the third in a series of briefing papers that assess general themes advanced at the 2007 Farm Bill Forums held during 2005 by Secretary Mike Johanns as well as related issues that have emerged in recent months. This paper describes the current state of rural development, discusses and evaluates current key rural development programs available to communities and individuals through the Department of Agriculture (USDA), and concludes with a discussion of general policy alternatives. The alternatives represent generalized approaches to addressing some of the key concerns that have been raised with regard to rural development. The alternatives are not recommendations but are presented for further discussion for the 2007 Farm Bill.

II Background: Rural Development, What Is It and Where Are We Today?

What Is Rural Development?

Rural development is the improvement in overall rural community conditions, including economic and other quality-of-life considerations such as the environment, health, infrastructure, and housing. For most small communities, this improvement involves population and employment growth; however, such growth is neither a necessary nor a sufficient condition for rural development.

What Is the Current State of Rural Development?

This report uses the Office of Management and Budget (OMB) 2003 nonmetro county definition to describe rural people and places. OMB designates as metropolitan (metro) areas those counties that contain an urbanized area (an urban nucleus of 50,000 or more) and outlying counties with significant (at least 25 percent of workers) commuting of workers either to or from the urban nucleus. All other counties are nonmetropolitan (nonmetro) counties.

Rural-Urban Differences. Rural America is home to about 50 million people and covers 75 percent of the total land area of the Nation. Rural America is extremely diverse in geography, population density, and economic and social assets. Rural America has also long lagged behind urban America on key indicators of economic well-being, having higher poverty rates, lower incomes, and lower rates of employment growth. In recent years, the rural-urban gap for some of these indicators has diminished; however, the gaps remain. These differences in economic, environmental, and social conditions have motivated Federal programs to specifically help address the needs of rural residents and communities.

Employment has grown in both metro and nonmetro areas in recent years. However, nonmetro employment has grown at a slightly slower rate (Table 1). Since 1990, the employment growth in nonmetro areas has averaged 1 percent per year compared to 1.2 percent in metro areas. Metro and nonmetro unemployment rates have also been roughly comparable in recent years, with unemployment rates of 5.4 percent for nonmetro and 5.0 percent for metro in 2005.

Average income levels exhibit more significant rural-urban differences. In 2004, per capita nonmetro incomes averaged $25,104, 27.6 percent below the $34,668 average for metro areas. This income gap has fluctuated over time. In 1990 it was 28.5 percent, while in 2000 it was 30.1 percent. However, both metro and nonmetro areas have seen their average incomes rise over time in real (inflation adjusted) dollars. The average income levels in metro and nonmetro areas are not adjusted for cost of living differences. Rural areas are believed to have a cost of living advantage over urban areas. Although there is no gener-

ally accepted method for making such adjustments, the relatively higher cost of living in urban areas would cause the rural-urban gap to diminish if such adjustments were made. Nevertheless, poverty varies across the United States and rural America has many persistently poor areas.

During the 1990s, real per capita income rose about 14 percent in nonmetro areas, and despite slow U.S. economic growth in the early 2000s, nonmetro real income levels rose an additional 4 percent from 2000 to 2004. Along with the rise in incomes, the percentage of nonmetro persons living in households with incomes below the poverty threshold declined. In the 1990s, the nonmetro poverty rate declined markedly from 16.3 percent to 13.4 percent. With the slow U.S. economic growth in the early 2000s, however, nonmetro poverty increased, and by 2004 (the most recent data) the nonmetro poverty rate was at 14.9 percent. While this is still 2.6 percentage points higher than in metro areas, the nonmetro-metro poverty gap has declined since 1990 when the difference was 3.6 percentage points.

One of the reasons for these continuing rural-urban differences involves education. Rural workers tend to be less educated than urban workers, a distinct disadvantage at a time when the U.S. economy has been moving toward more high-skilled, service-based jobs. While the rural workforce has improved its educational attainment over time, with the percentage of adults age 25 and older with college degrees increasing from 12.4 percent in 1990 to 15.1 percent in 2000, the urban-rural gap also grew from 9.7 percentage points in 1990 to 11.3 percentage points in 2000.

TABLE 1. Rural-Urban Differences

Indicator	Nonmetro	Metro	Gap
Annual employment growth	Percent		Percentage Points
1990-2005	1.0	1.2	0.2
2000-2005	0.4	0.7	0.3
2004-2005	1.4	1.8	0.4
Unemployment rate, 2005	5.4	5.0	0.4
Real per capita income	2004 Dollars		Percent
1990	21,204	29,671	28.5
2000	24,148	34,540	30.1
2004	25,104	34,668	27.6
Poverty rate	Percent		Percentage Points
1990	16.3	12.7	3.6
2000	13.4	10.8	2.6
2004	14.9	12.3	2.6
Adults 25 and older with college degree	Percent		Percentage Points
1990	12.4	22.1	9.7
2000	15.1	26.4	11.3

[illegible] data from the Bureau of Labor Statistics, the Bureau of Economic Analysis, [illegible]

Conditions Vary by Type of Place. Since rural areas are no longer dominated by agriculture, the rural economy has become highly diverse. In 1950, about 40 percent of rural people lived on a farm and one-third of the rural workforce worked in production agriculture. Today, less than 10 percent of rural people live on a farm and only 6.5 percent of the rural workforce is directly employed in farm production. While the dominance of agriculture in the rural economy has declined sharply over the past 50 years, one in five rural counties continues to rely heavily on farming for employment or earnings (Figure 1). Located mainly in the Great Plains, 78 percent of these 403 farm-dependent counties experienced a loss in population from 2000 to 2005. Research conducted by USDA's Economic Research Service (ERS) found these places are not losing as many farm jobs as in previous years.

Manufacturing now directly accounts for over a quarter of rural private sector earnings. More than one in every four nonmetro counties depends primarily on manufacturing for its economic base. Many of these counties are in the South, where wages and education levels tend to be relatively low. Rural manufacturing employment declined during and after the last economic slowdown. Although it appears to have stabilized in the last few years, concerns remain over possible future employment losses from global competition, especially related to textile and apparel plants, many of which are in the South.

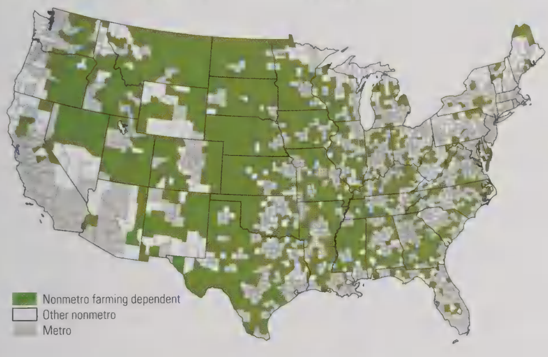
Rural recreation counties, which are generally located near mountains, lakes, beaches, and other desirable natural amenities, have had rapid growth in employment, with improvements in local income levels, earnings, and other measures of socioeconomic well-being. ERS has identified 334 of these rural recreation counties as of 2002. Retirement-destination counties and counties adjacent to metropolitan areas have also experienced relatively high rates of growth. The location of rural recreation and retirement-destination counties is presented in Figure 2.

Rural Population Growth and Migration Patterns. In recent years, rural population growth has slowed after strong growth in the 1990s. The U.S. nonmetro population increased by over 10 percent from 1990 to 2000, substantially above the 3 percent growth in the previous decade. From 2000 to 2005, the nonmetro population grew an additional 2.2 percent, reaching 49.9 million in 2005. This growth rate is about a third lower than that of the previous five years, 1995-2000, and significantly lower than the 6 percent growth in metro areas. However, different sub-population groups have grown at different rates. For example:

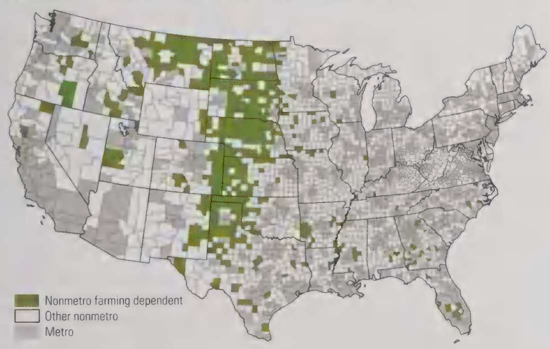
- Since 2000, the growth in the nonmetro population of 1.1 million has been evenly divided between natural increase—an excess of births over deaths (541,000)—and net immigration (545,000). Three-fifths of the in-movement was from abroad. The rest came from metro areas, as more people have moved to rural and small town places than away from them.
- Nonmetro population growth was higher among Hispanics than among non-Hispanic Whites, both in number (390,000 compared with 361,000) and rate (15 percent versus 1 percent). Asians shared a similarly rapid rate of growth but on a smaller population base, so the numeric change was smaller (47,000) than for either Whites or Hispanics.

FIGURE 1. Farming-Dependent Counties in 1950 and 2000

NONMETRO FARMING-DEPENDENT COUNTIES, 1950



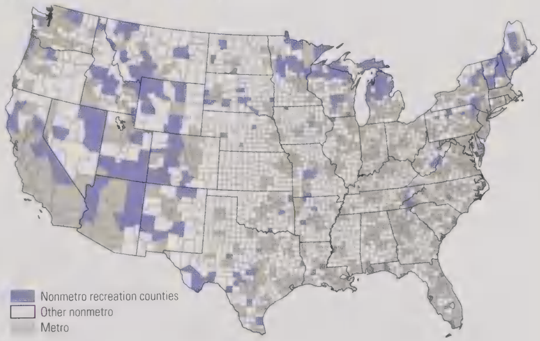
NONMETRO FARMING-DEPENDENT COUNTIES, 2000



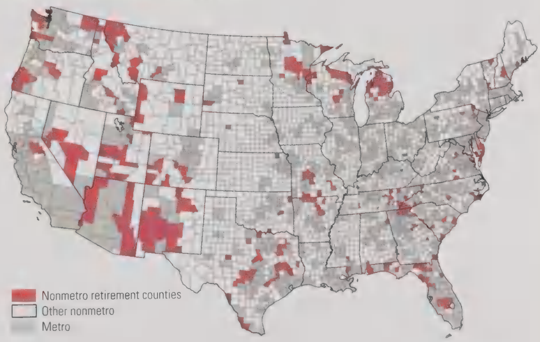
Source: Farming-dependent counties are defined by ERS. Metro/nonmetro status is based on the Office of Management and Budget (OMB) June 2003 classification.

FIGURE 2. Recreation and Retirement Counties

NONMETRO RECREATION COUNTIES



NONMETRO RETIREMENT COUNTIES



Source: ERS County Typology Codes, 2004. Metro/nonmetro status is based on the Office of Management and Budget (OMB) June 2003 classification.

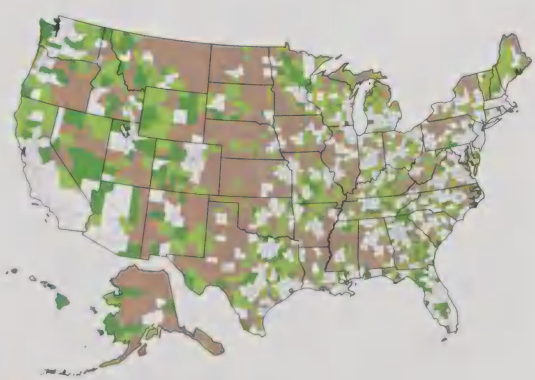
- Population fell in about half of the nonmetro counties from 2000 to 2005. Declining counties tend to be lightly populated and 30 percent of these counties are in farm-dependent areas, located mainly in the Great Plains and western Corn Belt, and also in mining areas and some southern manufacturing areas (Figure 3).

While the word "rural" is used here to describe only nonmetropolitan counties, millions of metropolitan residents living in open country and small settlements within metro areas are also defined as rural according to the Census definition. The Census Bureau considers open countryside and settlements with a population of less than 2,500 as rural; urban areas are larger (more populated) places with densely settled areas around them.

Slightly more than half of the Census-defined rural residents now live in metro areas. Metro counties that are primarily rural in population have been growing more rapidly than other metro counties in recent years.

A comparison of Figure 3 to Figures 2 and 1 shows the largest growth in rural population has occurred in areas which rely on nontraditional income sources. These include areas of the country that have capitalized either on natural resources and climate for recreation and retirement or on their proximity to urban areas. Alternatively, those regions of the country that rely on farming, lack urbanization, or are remote from large cities have seen declines in population.

FIGURE 3. **Nonmetro Population Change, 2000 - 05**



Source: Prepared by ERS using Census Bureau 2005 population estimates.

Rural areas, especially those near urban areas, also continue to experience changes in land use that changes the character of the rural areas. The National Resources Inventory data indicates that between 1982 and 2001, about 34 million acres—an area the size of Illinois—were converted to developed uses. The rate of development between 1997 and 2001 averaged 2.2 million acres per year. This was the same average rate experienced between 1992 and 1997, but up from 1.4 million acres per year in the previous decade (1982 - 1992). Between 1992 and 2001, about 6 million acres (28 percent) of the new land developed was prime farmland.

Rural Development and Agriculture. At one time, many viewed rural development and farm policy as synonymous. Over the past 60 years, rising productivity of farm labor has released labor to work in the growing industrial and service sectors of the economy. As we have seen, agriculture is no longer a dominant segment of the rural economy. Because farming is not the primary source of jobs and income in many rural areas, farm payments and other policies that affect farms generally have little noticeable impact on rural areas as a whole. There are some counties where reliance on farming is still high, and government policies can have noticeable impacts in those areas. However, even in farming-dependent counties, payments to farms are less than one-fifth of all Federal assistance in those counties.

While agriculture is a small part of the rural economy, farm households have become increasingly dependent on off-farm income. In 2003, 68 percent of farm households reported that the operator or spouse or both worked off the farm. In aggregate, almost 89 percent of U.S. farm household income reported in 2003 came from off-farm sources. Dependence on off-farm work has led many to observe that agriculture is far more dependent on the rural economy than the rural economy is on agriculture.

Federal Government Approaches to Rural Development

USDA is the lead Federal agency for rural development as designated by the Rural Development Policy Act of 1980. However, many other Federal agencies have significant rural development programs. A 2006 report by the Government Accountability Office found that while the USDA had most programs providing economic development assistance for rural areas, the U.S. Department of Transportation provided the largest amount of assistance. Many Federal agencies have some assistance aimed at rural development, including the Small Business Administration; the Environmental Protection Agency; and the Departments of Housing and Urban Development, Labor, Commerce, Health and Human Services, and Homeland Security. Because the focus of this paper is on providing information for consideration in the 2007 Farm Bill, we focus only on those programs within USDA.

Rural Development Program Overview

USDA's rural development activities focus on financing housing, community facilities, and community water and wastewater systems; providing financial and technical assistance for business development, including in the area of alternative energy; expanding the availability of broadband; financing generation, transmission, and distribution of electricity; providing payments and technical assistance to develop, maintain, and conserve natural resources; and conducting research to study how agricultural products can be processed and developed for new uses, including for the production of alternative energy sources.

Types of Assistance

The instruments used by USDA to stimulate rural development are just as diverse as the goals of USDA's rural development programs. Current USDA programs involve grants, direct loans, loan guarantees, and direct assistance. The instruments used by USDA include:

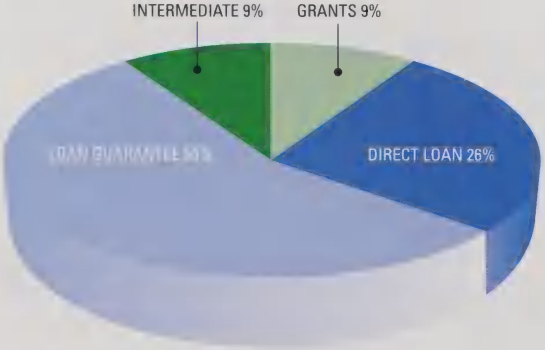
- ***Grants made for specific purposes.*** Grants do not require repayment and are typically evaluated on criteria established by law or regulation, including limits on the grant amount. For example, the Rural Development, Business and Cooperative Programs (BCP) makes grants under the Rural Business Enterprise Grants (RBEG) program to public bodies, private nonprofit corporations, and federally-recognized Indian Tribal groups to finance and facilitate development of small and emerging private business enterprises located in any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town. The funds are used for financing or developing small and emerging businesses.
- ***Direct loans for specific purposes.*** Direct loan eligibility and conditions for repayment and satisfaction are established by USDA programs. Applications are evaluated on criteria established by law or regulation, including limits on the loan amount. An example of direct loans made by USDA is the Housing and Community Facilities Programs Direct Loan Program (DLP). Most of the loans made under the DLP are to families with income below 80 percent of the median income level in the communities where they live. Direct loans may be made for purchasing an existing home or for constructing a new home.
- ***Loan guarantees to lenders.*** Loan guarantees for repayment of a portion of loans provide assistance to the borrower. Loan guarantees may depend on whether a borrower can obtain loans without the guarantee. Applications are evaluated on criteria established by law or regulation, including any limitations on the amount of the loan guarantee. For example, the Business and Industry (B&I) Guaranteed Loan Program provides guarantees up to 80 percent of a loan made by a recognized commercial or other authorized lenders in rural areas. Loan guarantees to lenders expand the lending capability of private lenders in rural areas.
- ***Intermediation.*** USDA also acts as an intermediary, supplying funds and assistance support to segments of the credit industry providing services to defined participants. For example, under the Rural Economic Development Loan Program, USDA provides zero-interest loans to electric and telephone utilities. The utility is then required to re-lend, at zero-percent interest, the loan proceeds to an eligible third-party recipient for the purpose of financing job creation projects and sustainable economic development within rural areas.

The allocation of USDA resources among the various delivery systems is shown in Figure 4. The estimates presented in Figure 4 represent the share of program-level financial assistance (e.g., loan principal on guaranteed loans). Program-level assistance represents the gross value of financial assistance USDA provides the public. Because many rural development programs include loans and loan guarantees, program-level assistance is greater than actual budget authority or outlays. For example, for fiscal year (FY) 2006, the program-level assistance for the USDA Rural Development mission area is estimated to be about $18 billion, compared with budget authority of $2.6 billion.

Loan guarantees represent over 50 percent of the total USDA Rural Development program level assistance. Direct loans represent about 26 percent of USDA program-level assistance, and about 9 percent of USDA program-level assistance goes toward supporting its role as an intermediary and in the form of grants.

USDA also provides direct assistance through research, technical assistance, and development assistance. Direct assistance services are provided either directly by USDA or through USDA funding to third party organizations such as universities that offer the services to the ultimate recipient. Most program areas have some component of direct assistance. Assistance may range from services given to individual recipients to services available to rural areas or the general public in educational settings. For example, USDA's Cooperative State Research, Education, and Extension Service (CSREES) Regional Rural Development Centers (RRDC) link the research and educational outreach capacity of the Nation's public universities with communities, local decision-makers, entrepreneurs, families, and farmers and ranchers to help address a wide range of development issues. In some cases, direct assistance may take the form of cost-share arrangements, where USDA provides funds only if the private sector or State government provides additional funds.

FIGURE 4. Methods of Assistance of USDA Rural Development Mission Area Programs, FY 2006[1/]



1/ [illegible] assistance. Total may not equal 100 percent due to rounding

Types of Programs

USDA's rural development programs fall mainly in the Rural Development (RD) mission area but other USDA mission areas also contribute to rural development. For example, the RD mission area can be divided into 8 program groups made up of nearly 80 activities organized into about 40 programs. The Research, Education and Economics (REE) mission area which includes the Agricultural Research Service (ARS), the Cooperative State Research, Education, and Extension Service (CSREES) and the Economic Research Service (ERS) also aids rural development through research, education, and extension.

The USDA conservation and farm price and income support programs also support rural development through investment in rural economies. In addition, conservation programs support rural development by protecting and enhancing environmental amenities which can attract amenity-oriented businesses to rural areas, encouraging sustainable production practices that help ensure the long-term economic viability of rural areas, and providing direct rural development assistance to rural areas. The Natural Resources and Environment (NRE) mission area, which includes the Natural Resources Conservation Service (NRCS) and the Forest Service (FS), administers over 25 USDA conservation programs. In the Farm and Foreign Agricultural Services (FFAS) mission area, the Farm Service Agency (FSA) administers farm price and income support programs, the Conservation Reserve Program, and farm operating, farm ownership, and emergency loan programs while the Risk Management Agency (RMA) administers crop insurance. This paper only discusses those USDA programs not addressed in the first two USDA Farm Bill Theme Papers. For details on USDA farm programs, see the *Risk Management* Farm Bill Theme Paper and for details on USDA conservation programs, see the *Conservation*

and the Environment Farm Bill Theme Paper. Also, we do not consider FSA direct and guaranteed farm ownership, operating loans, or emergency loan programs.

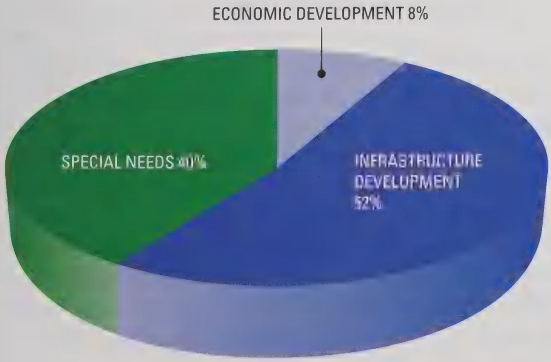
To facilitate an overview of the types of rural development programs, we group the programs under four broad categories:

1. economic development,
2. infrastructure development,
3. special needs programs, and
4. natural resource enhancement.

These development activities are interrelated. Programs aimed at economic development bring new business and employment to rural areas and offer new opportunities for income enhancement. Enhanced infrastructure development programs are designed to counter deficiencies caused by rural poverty or to equalize amenities with metro inhabitants. Special- needs programs are designed to provide individuals and communities without sufficient income access to some level of basic services such as housing, sanitation, or health care. Natural resource enhancement programs are focused on improving the services provided by the natural environment, such as improving water quality and recreational opportunities.

The allocation of USDA resources among the various rural development activities is shown in Figure 5. Over one-half of USDA Rural Development program-level assistance is directed toward infrastructure development. This includes programs devoted to providing electricity, improving water and waste water facilities, and telecommunications. About 40 percent of USDA rural development program-level assistance is devoted toward special needs, such as housing and community facilities. Less than 10 percent of USDA Rural Development program -level assistance is aimed at economic development. An overview of USDA RD programs, their objectives, uses, and target population can be found in the appendix to this paper.

FIGURE 5. Category of Assistance of USDA Rural Development Mission Area Programs, FY 2006[1/]



1/ Shares are based on program level of assistance.

Economic Development. Economic development is a change in the economic activities of a community or area that generates sustained income and employment opportunities. Not only is such development self-sustaining, it creates multiplier effects on other businesses as well. It leads to further growth along with accompanying income and employment that enable individuals to purchase housing and services otherwise beyond their reach. Economic development generates the resources, through taxes and other means, needed to build and maintain the kind of infrastructure that would otherwise require assistance.

Business. The driving force in rural life and rural development, however defined, is associated with business enterprises. Ten business programs in the RD mission area focus on strengthening business, helping entrepreneurs develop new businesses and new ideas, and maintaining the local character of such businesses. Program assistance provided through direct or guaranteed loans, grants, and technical assistance assists businesses directly or encourages business development through community service improvement. Among the business-oriented programs are those that assist purchases of real estate, buildings, equipment, supplies, and working capital for qualified endeavors. Feasibility studies, startup operating costs, and other activities may be funded for educational institutions, hotels, and recreational facilities to encourage development. Business programs also include assistance, through utilities borrowers, to establish revolving loan programs, support community development, and provide technical assistance. In FY 2006, the RD mission area is estimated to provide grants, direct loans, and loan guarantees with a program level over $1.3 billion for the business and community development objectives of business programs. The largest of these programs is the Business & Industry (B&I) loan guarantee program, which provides protection against loan losses so that private lenders are willing to extend credit to

establish, expand, or modernize rural businesses. Program level assistance for the B&I loan guarantee program is estimated to exceed $900 million in FY 2006.

Cooperatives and Producer Enterprises. Programs directed to agricultural producer owned and controlled cooperative organizations deliver service through 16 assistance and grant programs. Value-added agricultural product market development grants are given directly to agricultural producers, producer groups, cooperatives, and majority-controlled producer-based business ventures to develop new markets and add value to agricultural commodities, supporting ventures in emerging markets. Other programs enable entities to develop venture capital systems for emerging rural enterprises. Cooperative programs support producer cooperatives with technical assistance, development assistance, research, and education, both for existing cooperatives and for producers organizing cooperatives. These programs do not provide funding to cooperatives. However, assistance may be provided to universities to carry on research on market structures and farmer organizations. Special organizations are established and supported at universities to provide sources of information on sustainable agricultural production and value-added agriculture. In FY 2006, the program-level assistance for cooperatives and producer enterprises is expected to total about $110 million.

Energy. A new and growing area for USDA is in alternative energy and energy conservation. For example, Section 9006 of the 2002 Farm Bill authorizes loans, loan guarantees, and grants for farmers, ranchers, and rural small businesses to produce alternative energy or to make changes to their operations that conserve energy. Most of the program level for the 9006 Program is for loan guarantees, which has a program level of over $150 million in FY 2006. USDA has a range of other loan, research, and procurement programs that support alternative energy and bio-products. Energy will be the subject of the next Farm Bill theme paper.

Infrastructure Development. Improvements supported by these programs enhance communities' abilities to generate economic development because they provide the infrastructure needed to attract capital, entrepreneurs, and skilled labor, including blue collar and white collar workers and other professionals. Examples include modernized community facilities and systems, including broadband, access to expert medical advice, and educational opportunities.

Electricity. The RD mission area offers direct loans and loan guarantees to electric utilities serving customers in rural areas through 10 programs. USDA is the majority note-holder for nearly 750 electric systems. Assistance is available through various programs to finance electric distribution and sub-transmission facilities, build bulk transmission and generation facilities, acquire equipment, construct or improve facilities, and associated activities. Ninety-six percent of the energy companies receiving assistance are non-profit cooperatives owned and operated by the rural residents they serve. Technical assistance and training are also funded. Financing assistance is offered for solar, wind, hydropower, biomass, and geothermal energy generation under newer programs. The RD mission area also provides assistance to rural communities with extremely high energy costs. In FY 2006, electricity programs are estimated to provide a program level of more than $5.4 billion, including technical assistance.

Water and Waste Disposal. The RD mission area makes direct loans and grants to develop drinking water and wastewater systems in rural areas through eight programs. Programs also include solid waste disposal and storm drainage assistance. Financial assistance is offered to construct and improve water and waste facilities as well as design and provide technical assistance to local and regional governments. In FY 2006, these programs are estimated to have a program level of nearly $1.6 billion in grants, loans, and loan guarantees to public entities and Native American Tribes.

Telecommunications. The RD mission area provides loans and loan guarantees to telecommunications providers throughout rural America. Assistance is provided to build, acquire, extend, improve, and refinance telephone infrastructure. Telecommunications have changed dramatically in the last two decades and USDA has responded through new programs. A new rural broadband access program provides loans in rural areas without broadband services. Educational and health care needs of rural America are also supported by loans and grants under the distance learning and telemedicine programs. Equipment, land, facilities, and other needs are met by an array of funding activities.

In FY 2006, the program-level assistance for the various telecommunications programs is estimated at $1.3 billion in grants, direct loans, and loan guarantees.

Special Needs. Special-needs programs are intended to raise the quality of life for rural residents by providing access to basic individual and community services. One objective of assistance is to enable individual rural residents with comparatively inadequate income to maintain, at least at a minimal level, basic needs such as housing, sanitation, and health care. Programs in this category either provide resources directly to individuals in need or make resources available for individuals to draw upon.

Another group of programs address what may be viewed as effects of the prevalence of low income in some rural areas at the community level. This may be evidenced by inadequate public services, including the lack of adequate health care facilities. Programs that alleviate housing, sanitation, health care, and other such needs that are unmet because of low income levels are included in this category of programs.

Housing. Sixteen programs implement the RD housing mission. Primarily through grants, loans, and loan guarantees, USDA assistance addresses several needs in rural housing. The housing programs help finance new or improved housing for low- to moderate-income families and individuals. Grants, direct loans, and loan guarantees in several programs are used by individuals to build, purchase, or repair their homes and remove health or safety hazards. In others, rental subsidies are paid directly to renters meeting certain qualifications. Programs address the special needs of agricultural workers. Funds in other programs can be used to build multi-family rental housing; buy and develop building sites with associated roads, streets, and utilities; and for rehabilitation of multi-family dwellings. Programs address both single-family housing needs and multi-unit facilities. A program level of $7.4 billion for FY 2006 is estimated for grants, direct loans, and guaranteed loans for rural housing and related purposes. Several programs also include technical and supervisory assistance for mutual self-help efforts. Housing programs are authorized by the Housing Act of 1949, which is under the jurisdiction of the Senate Banking Committee and the House Financial Services Committee. Neither of these Committees directly participates in the development of farm bills, so these programs may not be the subject of upcoming Farm Bill debate.

Community Facilities. Seven programs in the RD mission provide necessary community services for those living in rural areas. Direct loans and guarantees to third party loans are used to develop essential community facilities in rural areas. Funds may be used to construct, enlarge, or improve more than 80 types of community facilities for health care, public safety, and public transportation services, among others. Programs of technical assistance are designed to help recipients develop or increase their capacity to undertake community-based projects in rural areas. In FY 2006, the community facilities programs are estimated to provide a program level of $541 million for essential community facilities for public use.

Natural Resource Enhancement. Enhancing the natural resources in rural areas has a positive effect on rural development by attracting amenity-oriented businesses, providing recreational and tourism opportunities, encouraging sustainable agricultural and forestry production practices that help ensure the long-term economic viability of rural areas, and providing direct rural development assistance to rural areas. A study by ERS found that population change in rural counties since 1970 has been strongly related to their attractiveness as places to live. Natural aspects of attractiveness include: a mild climate, varied topography, and proximity to water.

Encouraging Sustainable Agricultural and Forestry Practices. Another aspect of USDA conservation programs is that they contribute to long-term economic viability by conserving natural resources. Programs that contribute to the sustainability of rural areas include the NRCS Environmental Quality Incentives Program (EQIP), Conservation Security Program (CSP), Wildlife Habitat Incentives Program (WHIP), and Wetlands Reserve Program (WRP); and the FSA Conservation Reserve Program (CRP), including the Conservation Reserve Enhancement Program (CREP). The NRCS Resource Conservation & Development (RC&D) Program provides technical assistance to communities within USDA designated multi-county areas for land conservation, land management, and water management. Other programs such as NRCS's Farm and Ranch Lands Protection Program (FRPP), Grassland Reserve Program (GRP), along with the

TABLE 2. Assistance to Persistently Poor Counties, 2001

Selected USDA [Programs]	All Nonmetro Counties	Nonmetro [Poverty] [Counties]
	Dollars per capita 2001	
ECONOMIC DEVELOPMENT	**27.45**	**23.08**
[illegible]		
Intermediary Re-lending Program Direct Loans	0.52	0.92
Business and Industry Direct Loans	0.64	0.98
Business and Industry Guaranteed Loans	25.09	19.63
Rural Business Enterprise Grants	0.60	1.20
Rural Business Opportunity Grants	0.12	0.14
[Cooperatives and Producer Enterprises]		
Rural Cooperative Development Grants	0.48	0.21
INFRASTRUCTURE PROGRAMS	**18.01**	**24.78**
Water and Waste Disposal System Direct Loans	9.66	11.79
Water and Waste Disposal System Grants	7.38	11.92
Water and Waste Disposal System Guaranteed Loans	0.05	0.02
Section 306C Water and Waste Disposal Grants	0.39	0.55
Technical Assistance and Training Grants	0.19	0.00
Solid Waste Management Grants	0.03	0.02
Emergency Community Water Assistance Grants	0.31	0.48
SPECIAL NEEDS	**51.23**	**49.68**
[Housing]		
Farm Labor Housing Direct Loans	0.19	0.16
Farm Labor Housing Grants	0.01	0.02
Low-Income Housing Direct Loans	9.17	11.03
Low-Income Housing Guaranteed Loans	23.95	12.63
Rural Rental Housing Loans	0.93	1.13
Rural Rental Assistance Payments	8.57	13.19
Very Low-Income Housing Repair Direct Loans	0.45	0.90
Very Low-Income Housing Repair Grants	0.45	0.82
Rural Self-Help Housing Technical Assistance Grants	0.14	0.15
Rural Housing Preservation Grants	0.10	0.15
Section 504 Housing Repair Grants – Natural Disaster	0.03	0.10
Section 502 Housing Direct Loans – Natural Disaster	0.07	0.10
[Community Facilities]		
Community Facility Direct Loans	4.34	3.49
Community Facility Grants	1.09	3.04
Community Facility Guaranteed Loans	1.34	2.54
[Other Special Needs Programs]		
Empowerment Zones Program Grants	0.04	0.14
Rural Economic Development Direct Loans	0.09	0.09
High Energy Cost Rural Communities Grants	0.27	0.00

[illegible] Consolidated Federal Funds Reports data, Bureau of the Census

FS Forest Legacy Program (FLP), all support the purchase of conservation easements that protect farm, ranch, and forest lands from conversion to nonagricultural or non-forestry uses. In addition, programs such as the FS Forest Stewardship Program (FSP) provide technical assistance to private landowners to improve forest management using the authorities provided by the Healthy Forests Restoration Act of 2003 (HFRA) to work with communities to develop Community Wildfire Protection Plans (CWPP). CWPP reduce wildland fire hazards in areas surrounding communities.

Providing Recreational and Tourism Opportunities. Tourism is the third largest industry in the United States. The National Survey on Recreation and the Environment estimated that 63 million Americans visited farms in 2000-01 and spent an average of $45 per person. The survey indicated that 86 percent of the visitors to rural areas took the trip to enjoy the scenery. The growth in farmers markets (over 3,300 in 2003) is another indicator of the interest the public has in rural areas. In response to the public's interest in farm-related recreation, during the past two decades, landowners have shifted to alternative enterprises and agri-tourism to supplement their income. In addition, the FS estimates that annual visits to National Forest System (NFS) lands exceeds 200 million and annual visits to viewing corridors approaches 175 million.

Distribution of Assistance by Location and Need.

Most USDA RD mission area programs have eligibility requirements defined by recipient location or the location of services provided by recipients, a natural consequence of the focus on economic opportunities and improved quality of life in rural America. As a result, most, though not all, programs in the RD mission area are targeted to geographic areas. In addition, many programs either restrict eligibility to lower income individuals or give preference to low-income places when awarding grants or loans. This generally results in low-income places receiving more assistance, on a per capita basis, than other places. Table 2 (following page) compares 2001 assistance data of persistently poor nonmetro counties with nonmetro counties in general. Persistently poor nonmetro counties tend to benefit more from grants and direct loans and less from guaranteed loans, since the repayment burden for guaranteed loans for poor borrowers is greater. For example, per capita

assistance on low-income housing guaranteed loans in all nonmetro counties averaged $23.95 in 2001 compared to only $12.63 in persistently poor nonmetro counties.

Alternatively, per capita rural rental assistance in all nonmetro counties averaged $8.57 in 2001 compared to $13.19 in persistently poor nonmetro counties. Some guaranteed loan programs are also in more demand in high-growth areas, which are not generally poor.

Assistance also varies by type of program. Per capita assistance from programs aimed at increasing economic development, such as business programs, was higher in all nonmetro counties compared to persistently poor nonmetro counties, while per capita assistance from programs aimed at improving infrastructure were greater in persistently poor nonmetro counties than in nonmetro counties in general. The differences in assistance by type of program reflect both the types of assistance mechanisms available and the diversity in needs for various services.

IV Economic and Policy Issues for Rural Development Programs

This section provides a general assessment of the support provided by current programs using several evaluation criteria: furthering rural development, targeting of funds, program cost, and implications for U.S. commitments under the World Trade Organization (WTO). However, there is no unique measure for rural development. We evaluate how current USDA programs further rural development within two goals: economic development and improving the quality of life in rural communities. This section draws on conclusions based primarily on two sources of information: the USDA's FY 2005 Performance and Accountability Report and the Office of Management and Budget's (OMB) Program Assessment Rating Tool (PART) reviews. While we do not evaluate every USDA program, our evaluation covers a majority of USDA program- level assistance for rural development.

Economic Development

Economic development programs fall generally into two categories: (1) those that focus on enhancing entrepreneurship through direct assistance, training, information dissemination, and enterprise development and (2) those that enhance capital formation in rural communities. USDA is developing a pilot information system, the Socio-Economic Benefit Assessment System (SEBAS), to enhance its ability to measure program-investment effectiveness. SEBAS, which uses detailed information about loan or grant awards, will enable USDA to measure the direct and indirect impacts of program assistance on local and regional economic performance, and on the quality of life in rural areas.

Business. The RD mission area estimates that in FY 2005 its business programs created over 73,000 jobs and "impacted" over 12,000 businesses. The largest business program, in terms of program-level assistance, is the B&I loan guarantee program. The B&I program represented about 80 percent ($675 million) of the program-level assistance the RD mission area allocated to business programs in FY 2005. The program provides guarantees up to 80 percent of a loan made by a commercial lender. The primary purpose of the B&I program is to create and maintain employment and improve the economic climate in rural communities. The capital formation, combined with technical assistance and enterprise development, enables businesses to start and grow, providing income and employment in rural areas.

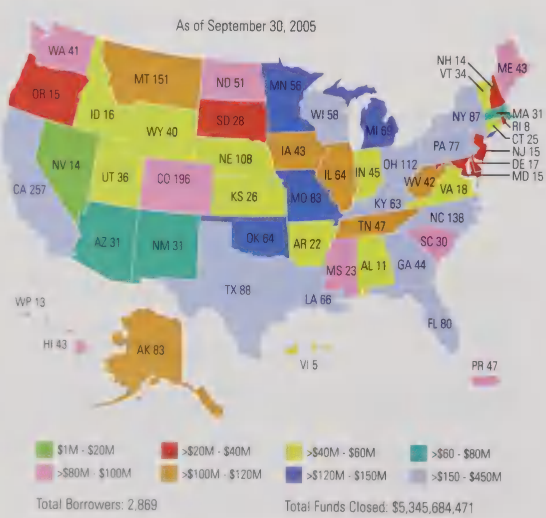
One measure of the contribution of the B&I program toward rural development is the number of jobs created in rural areas. The B&I program counts jobs when the loan is closed, a practice also used for several grant programs. In FY 2005, the B&I program guaranteed 335 loans and is estimated to have created 4,500 jobs and saved an additional 11,000 jobs. This translates into 1 job created or saved for every $2,200 in FY 2005 budget authority. During FY 2002-05, the B&I program guaranteed over 2,200 loans and created almost 23,000 jobs and saved almost 68,000 jobs, or 1 job created or saved for every $1,500 in budget authority. In addition to direct jobs created and saved, the indirect economic benefits to the rural community through greater economic activity are estimated to be $2.50 for every dollar in guaranteed loans closed, according to U.S. Department of Labor statistics. While these measures of effect may be useful for comparing one program to another or a program over time, they are limited in that they do not provide estimates of net employment—the employ-

ment after the investment less the employment that would have occurred in the absence of the investment. The SEBAS project is designed to address this deficiency.

The B&I program is targeted to rural residents, and is further prioritized to meet the greatest need of communities suffering from outmigration, persistent poverty, long-term population decline and job deterioration, natural disasters, and fundamental structural changes in their economic base. A geographic distribution of B&I loans for FY 2001-05 is presented in Figure 6, which indicates California, North Carolina, Ohio, Texas, New York, Florida, and Pennsylvania have received the largest amount of B&I assistance.

The FY 2005 OMB PART review for the B&I program raised a concern over the number of defaulted loans occurring in this program. National and regional economic trends are the primary influence on default rates, followed by the local business environment and finally the quality of the agency's loan underwriting. While USDA cannot control macroeconomic factors or the conditions of each rural community, it has begun strengthening loan underwriting through continuous training, as well as implementing an accreditation program. The results have started to appear in the form of decreasing delinquency rates.

FIGURE 6. Distribution of B&I Loans, FY 2001-05



Cooperative and Producer Enterprises. Entrepreneurship enhancement is found in several programs. The most direct assistance is implemented by Cooperative Programs. Cooperative Programs staff provides information, research, technical assistance, education, and development services to rural cooperatives. Cooperative Programs focuses on entrepreneurship so the program's impact is not measurable by the funding provided to recipients.

Cooperative Programs also administers the Value Added Producer Grant Program (VAPG). In FY 2005, 172 grants were awarded that allowed individuals and businesses to assess the feasibility and take initial steps in bringing creative entrepreneurship to rural areas by developing value-adding businesses for agricultural producers and producer groups. Grants in FY 2005 totaled almost $15 million to enterprises located in 42 States. Table 3 presents a regional breakdown for VAPG assistance in 2005. Data are not available on the effects of VAPG on rural growth and employment.

Infrastructure Development

Electricity. Under authority of the Rural Electrification Act of 1936, USDA makes loans and loan guarantees to electric utilities to serve rural customers. These borrowers are responsible for about 40 percent of the national electric

TABLE 3. Value-Added Producer Grants, FY 2005

State	Number	Assistance	State	Number	Assistance
AZ	1	$30,050	MS	4	$495,000
CA	13	$1,196,630	MT	1	$59,998
CO	3	$252,000	NC	2	$179,600
CT	1	$150,000	ND	2	$250,000
DE	1	$150,000	NE	16	$1,113,540
FL	6	$613,717	NH	1	$40,362
GA	2	$168,404	NJ	3	$51,500
HI	1	$105,275	NY	3	$162,783
IA	13	$1,177,075	OH	3	$98,750
ID	2	$139,667	OK	1	$25,000
IL	4	$299,125	OR	11	$536,985
IN	3	$300,000	PA	3	$258,248
KS	7	$504,616	RI	1	$50,000
KY	1	$150,000	SD	2	$198,250
LA	1	$30,400	TN	1	$150,000
MA	1	$180,400	TX	11	$1,074,896
MD	2	$175,852	VA	2	$94,500
ME	1	$33,937	VT	1	$150,000
MI	4	$441,452	WA	6	$461,175
MN	7	$823,250	WI	5	$549,789
MO	17	$1,750,446	WY	2	$200,000
			U.S. Total	**172**	**$14,872,672**

distribution grid. The rationale for government involvement is that providing electricity in rural areas is more difficult and expensive per customer than in urban areas. Working through rural cooperatives, not-for-profit associations, public bodies, and for-profit utilities, RD programs provide leadership and capital to upgrade, expand, maintain, and replace the rural electric infrastructure. The electric programs help rural utilities expand and keep their technology current as well as establish new and vital electrical services.

In FY 2005, USDA's electric programs approved 111 loans to rural distribution, generation, and transmission providers, worth more than $3.3 billion. The loans connected about 195,000 new consumers and improved electrical service to about 2.4 million customers. Customers served by new or improved electric facilities totaled almost 22 million for FY 2002-05. Through program operations in past years, the Federal Government is now the majority note holder for more than 750 electric systems.

In the next 5-7 years, the United States is facing a shortage of cost-effective base load electric generation capacity. RD and the rural electric industry estimated that during that time RD's current generation and transmission borrowers will need an additional $30 billion in financing from the Rural Utilities Service (RUS) to meet this demand for base load generation capacity.

The OMB FY 2005 PART review for the RUS electric loans program raised a concern that except for the Hardship loans, RUS electric loans are not provided in such a way that would focus support to areas of greatest need. In addition, loan funds do not always go to rural areas.

Table 4 presents a geographic breakdown of RUS electric loans in FY 2005. The program statistics show that the State-by-State benefits distribution varies widely among programs and depends on program objectives and targets. While identified by State, ultimate recipients, in this case consumers of electricity, will be found in many regions of rural America.

TABLE 4. Rural Electric Loans for Distribution Facilities, FY 2005

State	Number	Assistance	State	Number	Assistance
AL	2	$18,650,000	MT	4	$22,185,000
AK	1	$82,448,000	NM	1	$13,823,000
AR	1	$33,231,000	NY	1	$4,300,000
CO	3	$45,390,000	NC	4	$129,789,000
FL	1	$75,000,000	ND	2	$14,185,000
GA	7	$104,411,600	OH	2	$10,713,000
IL	1	$1,464,000	PA	2	$22,300,000
IN	1	$5,500,000	SC	3	$128,540,000
IA	2	$6,000,000	SD	8	$59,310,000
KS	6	$31,814,000	TN	5	$78,585,000
KY	8	$150,697,000	TX	6	$58,923,000
LA	3	$109,698,000	VA	2	$25,800,000
MI	3	$35,154,000	WI	1	$5,527,000
MN	10	$69,426,000	WY	2	$11,057,000
MO	2	$33,216,000			
			U.S. Total	**94**	**$1,387,136,600**

Water and Waste Disposal. Water and wastewater disposal loans and grants are provided to rural communities for the development, replacement, or upgrading of such facilities. The Environmental Protection Agency (EPA) found that small communities (communities with fewer than 10,000 people) with an average daily wastewater flow of less than 1 million gallons, have documented needs of approximately $16 billion for wastewater treatment over the next 20 years. The EPA also found the total rural needs for wastewater treatment systems was in excess of $50 billion over the next 20 years. In terms of infrastructure needs to ensure safe drinking water quality, the EPA found that medium-size communities (3,300 to 50,000 people) will need to spend about $43 billion, in total, over the next 20 years, while small communities (3,300 and less people) will need to spend almost $31 billion, in total, over the next 20 years.

The need to improve water and waste disposal systems has created a demand for RD mission area water and wastewater disposal loans and grants with a considerable backlog of applications. Since the program's inception in 1937, water and wastewater disposal borrowers have received $29 billion in direct loans, loan guarantees, and grants. In FY 2005, 1.3 million customers were served by new or improved water and wastewater disposal systems funded by the programs. During FY 2002-05, about 3.65 million individuals directly benefited from the programs.

The programs have become proactive in creating better output and outcome measurements. These measurement changes are designed to quantify program effects and identify solutions to serve rural residents better. In May 2005, the program revised its long-term measures to focus strategically on reducing rural people's exposure to water-related health and safety hazards by FY 2010. Another long-term goal will focus on maintaining sustainable water systems

in rural communities. Annual analyses will track program data to improve funds leveraged for project development. The analysis will also be used to improve the loan-to-grant mix so that more loan dollars are directed to systems that can afford maximum debt capacity, and provide grant funds only to the neediest systems.

The OMB FY 2005 PART review for the Rural Utilities Service (RUS) water and wastewater disposal loan program noted that RUS has also established a priority ranking system in its regulations to target financial and technical resources to the neediest communities. Water and wastewater projects designated as priorities for financial assistance are those that (1) serve low population communities, (2) address health risks, and (3) serve communities with median household income less than the poverty level or the State nonmetropolitan median. The Rural Development National Office also has discretion to establish priorities for projects based on identified target areas, specific set asides, and reserve accounts. Projects may be given priority consideration for emergency conditions and cost overruns.

Telecommunications/Rural Broadband. A new broadband loan and loan guarantee program was established by the 2002 Farm Bill. The program is designed to fund the cost of constructing, improving, and acquiring facilities and equipment for broadband service in rural communities of defined size. Direct loans are made for the life of the facilities financed. Loans may be made at a 4 percent rate of interest to rural communities where broadband service currently does not exist. The number of counties receiving new service measures the extent to which the deployment of broadband is achieved.

The broadband loan program is different from USDA's traditional telecommunications program portfolio. First, even in today's technology-driven marketplace, broadband service, while critically important, still is not a "necessity-of-life" in the same manner as electricity, telephone service, and water and wastewater disposal. Second, a majority of the current applicants are "start-up" companies with little, if any, history of doing business in this industry. Third, today's marketplace is highly competitive as opposed to the traditional monopolistic environment. Finally, many applications cover multi-State service territories, rather than a single cooperative serving a single rural community. Many of the applications request to serve 50, 75, or in excess of 100 rural communities in several States. These differences, while opening the door to a greater number of potential applicants, pose new challenges for a lending program. Fewer than expected eligible and complete applications have been received in the broadband program. Program staff have revised procedures and worked with applicants to improve the efficiency of applications review and loan processing, and to facilitate participation by borrowers.

Customers served by new or improved broadband facilities totaled 232,000 in FY 2005. Combining this with the two previous years in which the program operated, 988,000 customers are served with assistance of the broadband program.

While consumers have benefited from greater broadband service, the program has come under some criticism. In 2005, the USDA Office of Inspector General (OIG) found that "During the 4 years the RUS has administered Federal loans and grants for extending broadband service to rural America, the program's focus has shifted away from those rural communities that would not, without Government assistance, have access to broadband technologies." The OIG found the change in focus occurred because (1) RUS has not satisfactorily implemented statutory requirements for serving rural instead of suburban areas, nor does it have a system that can guarantee that communities without preexisting service receive priority and (2) inconsistent administration of the programs has resulted in irregularities in approving and servicing grants and loans. OIG questioned over half of the funds reviewed.

Special Needs

Housing. Of the Nation's 2,000-plus nonmetro counties, 302 are defined as housing stressed, according to ERS's county typology. In these counties, at least 30 percent of households failed to meet widely used standards for minimum basic amenities in 2000. This categorization of household-level housing stress requires that one or more of the following conditions be met: (1) housing expense/income threshold—expenses exceed 30 percent of income, (2) crowding—more household members than rooms, (3) incomplete plumbing—home lacked necessary bathroom facilities, and (4) incomplete kitchen—home lacked essential kitchen facilities.

To address these housing needs, USDA implements a wide variety of housing programs. Through its Single Family Housing Direct and Guaranteed Loan Programs,

USDA helps rural families who would otherwise not be able to own homes. In FY 2005, USDA invested $4.24 billion to assist 44,224 rural families in obtaining homes, and an additional $66 million to rehabilitate the homes of more than 11,700 very-low-income families. Minority homeownership increased by 7,605 as a result of these programs. From FY 2002 to FY 2005, financial assistance was provided to 180,284 rural households with an increase in minority homeownership of 32,875.

The average annual income for families receiving direct loans is approximately $22,200, while the average for guaranteed loans is approximately $40,627. Families obtaining repair loans had average incomes of $11,330, while elderly households receiving repair grants earned only $10,240.

While the results are somewhat dated, a 1998 study conducted by ERS regarding the RD mission area single family direct loans (known as Section 502 loans) found that borrowers from the program were under 40, had children, had low or modest incomes, had a home that is better than their previous residence, and were satisfied with their current home, neighborhood, and the Section 502 program. Most believed that, without assistance from the program, they would have been unable to afford a comparable home for at least 2 years and possibly ever.

Another aspect of USDA's housing program is the rental assistance provided as part of its multi-family housing program. Rental assistance makes up the difference between 30 percent of income that low-income tenants contribute toward their rent and a "basic" rent that reflects the operating costs of the project, including the project's debt servicing requirements. The assistance is linked to units in a project as long as that project remains in the program and the units are occupied by tenants who qualify for the assistance. Unlike vouchers, rental assistance cannot be retained by tenants who move. About 60 percent of the units in USDA's multi-family housing portfolio receive rental assistance payments.

Concerns have been raised regarding USDA's multi-family housing program. Most of the properties in the program were constructed between 1977 and 1990, and they are reaching the end of their normal useful life as constructed. Based on an internal study of these properties, USDA determined it was more cost effective to rehabilitate these properties than to rebuild them. For FY 2006, RD received funds to support a program level of over $150 million to start the process of rehabilitating these properties.

In FY 2004, the USDA OIG had found that USDA's Rural Housing Service (RHS) needed to do a better job of inspecting and repairing its aging portfolio of rural rental housing projects, implement wage matching to identify excessive rental assistance, and identify and prevent theft (equity skimming) of project funds. However, due to regulation changes initiated by RHS, the OIG removed this issue from its list of management challenges facing the Department.

Community Facilities. USDA provides a series of grants, loans, and loan guarantees to finance the development of facilities essential to a modern standard of living in rural communities. A wide range of public facilities and equipment can be financed by these programs including hospitals, fire trucks, police cars, child-care centers, food banks, schools, medical clinics, nursing homes, community centers, town halls, jails, and street improvements. The programs leverage Federal funds with private capital to invest in rural infrastructure, technology, and human-resource development.

In FY 2005, 12.9 million individuals were served by new or improved community facilities. USDA provided funds to construct, renovate or improve 812 essential community facilities, including 112 health-care facilities, 312 public-safety facilities, 92 educational facilities, 15 energy-related facilities, 157 public buildings, 7 recreation facilities, and a number of other essential community facilities. Community facilities assisted during FY 2002-05 served 39.3 million individuals.

The OMB FY 2005 PART review for the RHS community facilities program noted that the program had clearly stated population and income requirements targeting low-income rural communities which, by definition, have severely limited resources to meet the needs of their residents. Priority is given to communities with populations of 5,000 or less and priority points are also given to communities where the median household income of the service area is less than the poverty line for a family of four, or less than 80 percent of the State-wide nonmetropolitan median household income.

Natural Resource Enhancement

Resource Conservation & Development (RC&D).

One USDA program that was not discussed in the first two Farm Bill Theme Papers is the RC&D program. NRCS administers the RC&D program, which includes specific activities directed at fostering both natural resource conservation and rural development. The purpose of RC&D program is to accelerate the conservation, development, and utilization of natural resources; improve the general level of economic activity; and enhance the environment and standard of living in designated RC&D areas. In addition, the program works to improve the capability of local citizens to plan and implement programs and projects that address natural resource and community development issues within and across communities within a geographic region. Program objectives address improving the quality of life, including social, economic and environmental concerns; continuing prudent use of natural resources; and strengthening local citizens' ability to utilize available sources of assistance through USDA and other Federal agency partnerships. Objectives of the program are delineated by the statutory program elements of land conservation, water management, community development, and land management. The NRCS-administered RC&D program uses the local nonprofit RC&D leadership, the RC&D council, to ascertain community needs that are not being addressed by other programs or through other avenues, to form the basis for each individual strategic RC&D Area and annual plan. The average RC&D Area covers seven counties. Nearly half of the councils' members are locally elected officials such as mayors, judges, or commissioners. RC&D councils are able to create unique program applications that address unmet needs not previously recognized by other programs. The RC&D program also improves the capability of State, tribal, and local units of government and local nonprofit organizations in rural areas to plan, develop, and carry out programs for resource conservation and development. The RC&D councils' objectives include:

- provide small business loans to natural-resource-based business;
- create job opportunities through business planning and financial opportunities for small businesses;
- coordinate activities between communities and planning agencies for ecotourism, heritage tourism, and historic preservation in rural communities;
- assist with land acquisitions for green space and recreational opportunities;
- facilitate the use of multiple USDA RD programs within their communities such as establishing revolving loan programs, or establishing or improving community infrastructure;
- provide the resources for rural areas to understand opportunities available from the RD mission area;
- provide services as managers for land trusts, conservation easements, and mitigation programs for improved natural resource amenities;
- assist small natural-resource-based businesses to expand into value-added approaches through enhanced marketing programs;
- facilitate programs that enhance satisfaction of rural housing needs for the under-privileged;
- facilitate process between landowners and Federal agencies for conservation, wildlife, and recreational opportunities; and
- provide creative solutions and be on the cutting edge of emerging issues such as implementation of bio-energy projects and environmental credit trading opportunities.

The RC&D program is an appropriated account and the Administration's 2007 Budget proposes to modify the Federal RC&D council coordinator position to provide more technical oversight duties instead of day-to-day administration support. The local RC&D councils would be responsible for operation of their nonprofit corporations. This proposal would consolidate the number of Federal coordinator positions and eliminate duplication of rural development coordination efforts, but NRCS would still maintain its strategic planning and oversight assistance for all 375 authorized RC&D Areas nationwide.

Forest Conservation Programs. Two FS programs that were not discussed in the first two USDA Farm Bill Theme Papers were the Forest Legacy Program (FLP) and the Community Wildfire Protection Plans (CWPP).

FLP. FLP aids in protecting private forest land from being converted to nonforest uses. The FLP is a partnership with States and supports State efforts to protect environmentally sensitive forest lands. FLP helps States develop and carry out their forest conservation plans and encourages and supports acquisition of conservation easements

without removing the property from private ownership. FLP participation is limited to private forest landowners. To qualify, landowners are required to prepare a multiple resource management plan as part of the conservation easement acquisition. The Federal Government may fund up to 75 percent of project costs, with at least 25 percent coming from private, State or local sources. In addition to gains associated with the sale or donation of property rights, many landowners also benefit from reduced taxes associated with limits placed on land use. The FLP has grown in recent years to an FY 2006 budget authority level of $57 million and has protected over 1 million acres.

In a 2005 PART review of the FLP, the OMB noted: the program performs very well when compared to other land conservation programs, is efficient in getting maximum funds to the field to produce acquisitions, and has enjoyed excellent leveraging of Federal resources to produce acquisitions. The 2005 PART review also noted that in independent evaluations from OIG and the Government Accountability Office (GAO), FLP compared favorably with other government and private programs.

CWPP. One of the most significant conservation issues facing America today is the need to protect lives and property in communities near large areas of forested land, the so-called wildland-urban interface. CWPPs enable communities to establish a localized definition of the wildland-urban interface in their area, and high-risk areas identified in a CWPP receive funding preference from the Forest Service. As of December 2005, at least 450 CWPPs had been completed nationwide, covering at least 2,250 communities at risk from wildfire.

Catastrophic fires threaten both the communities that are dependent on wildlands and natural resources for tourism and the recreation and wood products, ranching, and service industries that support them. Destroyed forests and damaged watersheds also impose a variety of economic costs to communities. In 2005, the FS also treated 2.7 million acres of land to reduce hazardous fuels, with over 60 percent of those acres in the wildland-urban interface.

Consistency With World Trade Organization Obligations

Another evaluation factor for rural development programs is their WTO consistency. Some rural development programs provide support to agricultural producers. The Uruguay Round Agreement on Agriculture (URAA) of the World Trade Organization (WTO) established criteria for classifying domestic farm programs by how much they distort production and trade. This classification is important because programs that are deemed to be minimally or non-trade distorting (so-called green box) are not subject to annual limits on domestic agricultural support, as are programs that are classified as trade-distorting (referred to as amber box). To be classified as minimally or non-trade distorting, a program must meet specific criteria spelled out in the URAA.

WTO member countries are obligated to notify, or report, programs to the WTO under the various domestic support categories. The United States has reported only two rural development programs under these paragraphs. (The last U.S. notification was made in 2004 for the crop years 2000 and 2001. No programs under the 2002 Farm Bill have been reported as the Doha negotiations have continued.)

Small expenditures have been reported for some salaries and expenses for the (former) Agricultural Cooperative Service and the (former) Alternative Agricultural Research program. The United States has also reported preferential loans and loan guarantees for structurally disadvantaged farmers ($103 million in 2001). These loans are often provided to beginning farmers who cannot qualify for conventional loans because they have insufficient financial resources, or to established farmers who have suffered financial setbacks from natural disasters, or whose resources are too limited to maintain profitable farming operations. The United States has not notified to the WTO loans, loan guarantees, and grants under the RD mission area because these programs are aimed at providing services to nonagricultural entities and beneficiaries, including housing, medical facilities, utilities, rural businesses, water and wastewater, and telecommunications.

Some grant programs are directed at agricultural cooperatives and businesses. Issues of consistency between such rural development programs and WTO criteria can be illustrated by examining the Agricultural Value-Added Agricultural Producer Grant Program, which has not been reported to the WTO. The VAPG program provides grants primarily for project planning and feasibility studies for developing value-added ventures. The program does not allow the grants to be used for on-farm or business purposes, such as acquiring or repairing equipment. As such, these grants appear to be consistent with the WTO criteria.

V Alternative Approaches to Rural Development

USDA's rural development programs are designed to accomplish two major purposes: provide socially based assistance to local rural communities and residents in need and facilitate market-based rural development. Pressures on Federal budget authority coupled with the requirements of the Federal Credit Reform Act of 1990 (Credit Reform Act) are pushing USDA's rural development programs toward market-based development and away from socially based assistance. Because most socially based rural development programs involve grants and subsidized direct loans, they tend to have higher Federal budget authority costs than unsubsidized loan guarantees. This situation encourages market-based over socially based rural development. Under the Credit Reform Act, loan guarantees tend to "cost less" than direct loans because loan guarantees require a private lender to risk some capital which suggests that the underlying loan is more likely to be repaid. USDA can leverage Federal budget authority by a factor of 20 to 1 or more by moving away from grants and toward guaranteed loans. For example, grants require $1 of budget authority for every $1 of assistance while direct loans usually require $0.25 of budget authority for every $1 of assistance, and loan guarantees can require from $0 to $0.10 of budget authority for every $1 of assistance.

One challenge during the Farm Bill consideration of USDA's rural development programs is finding ways to use the available Federal budget authority most effectively to meet both of these two critical objectives. This section presents alternatives that could help the Administration and the Congress develop legislation that would address the balance between these two objectives given the realities of the current Federal budget situation and the requirements of the Credit Reform Act.

The alternatives presented are not meant to be exhaustive or mutually exclusive, nor are they meant to represent specific legislative proposals for the upcoming Farm Bill. No specific alternative is being advocated. Rather, the alternatives represent generalized approaches to addressing concerns that have been raised with regard to current programs. They are presented as candidates for further public discussion to help inform the 2007 Farm Bill debate.

This discussion addresses the implication of these alternatives for furthering rural development, defined as improving both economic opportunities and quality of life. Possible effects on the distribution of assistance and program costs are also discussed. Although WTO consistency is an issue that spans each of the alternatives, we do not discuss it since the alternatives are viewed as extensions of the existing programs, which are considered green box programs, based on the discussion in the preceding section.

During the Secretary's Farm Bill Forums, considerable support was expressed for rural development programs. Public commenters consistently said the programs were effective. Thus, the three alternatives raised here have a common theme—they each offer alternative criteria and objectives for employing the existing basic tools of USDA rural development programs: loans, grants, and direct assistance. The first alternative suggests a series of targeting approaches for the existing set of rural development programs. The second alternative suggests a renewed focus on new business formation by inspiring and supporting rural entrepreneurship, with an emphasis on the use of rural financial capital grounded in the market-based rural development objective. The third alternative suggests consideration of broader regional areas as the focus of support thereby increasing the access of more local areas to supporting infrastructure, business services, leadership expertise, and other resources.

These alternatives need to be considered in context with the existing diversity in rural America. Those areas of the country that have either capitalized on natural resources and climate for recreation and retirement or their proximity to urban areas have generally been growing in terms of population. Alternatively, those regions of the country that rely on farming, lack urbanization, or are remote from large cities have seen declines in population.

Alternative 1. Maintain the Structure and Tools of Existing Programs but Refine Program Targeting.

Most USDA rural development programs are "targeted" in several ways, many with multiple eligibility requirements. Examples of such targeting were identified in the basic program descriptions, although more specific targeting may be found in detailed program descriptions, in the application process, and in criteria applied to assess the applications for awarding program benefits. Program targeting encompasses

both the broad policies of Federal Government assistance for rural areas and the narrower policies of each program's definition and application. The two are, of course, necessarily connected. Legislation defines essential targeting characteristics, and legislative changes can significantly modify current programs. Consequently, changed targeting of programs is the subject of farm bill consideration even where programs are maintained.

A prerequisite for targeting is objective information about program performance as measured against policy objectives. Many rural development programs have been operating for a considerable time, some for nearly three-quarters of a century, while others are relatively new. Each program has an overall objective related to improving economic development and quality of life in rural America. While limited program results can usually be measured, the larger impacts on the rural economy and rural residents are generally not available. Without such measures, there is only the thinnest analytical base for better program targeting.

Legislation may be considered to establish systems for objective and continuous monitoring of program impacts on rural America. The results of such measures would (1) provide information on whether programs are achieving the ultimate goals of economic and quality-of-life improvements and (2) enable USDA to use authorized discretion to redesign the administration of programs to more equitably distribute funds and more efficiently meet program objectives. New measurement methods could build on methods of assessment currently applied to address the wide variety of programs, needs to which the programs are targeted, and methods used to provide benefits including grants, direct loans, loan guarantees, and direct technical assistance. Systematic impact assessment would likely include a single, in-depth study to establish baselines and ongoing assessment associated with and appropriate to each program.

Following are targeting issues that may be appropriately addressed in farm bill consideration while generally maintaining the overall structure and balance of current programs:

- ***Targeting Based on Critical Needs.*** Most current programs are based on a perceived need. While these programs contribute to rural development, it is not clear that they are addressing the most important needs in rural America. With changing demographics, economic opportunities, increased communication, and the multitude of other social and economic factors defining rural America, the needs facing rural America are also changing and some of those needs may not be as important as they once were. A more targeted approach would direct programs to those issues that address the most critical needs. Legislation establishing existing programs may be revisited to determine if greater targeting would place the benefits of the programs where the need is demonstrably the greatest.

  Emphasis on critical needs may in fact be a reversion to the original purposes of many USDA rural development programs. Such needs may have changed substantially since the programs were initiated because of the profound changes that have taken place in agriculture and rural America in the past few decades. Targeting programs based on defined and felt needs may redistribute benefits in a more efficient manner with greater impacts than currently is the case.

  Targeting may differ depending on the goal of the program. For example, rural development programs could target income and establish a test for socially based rural development programs. The overall change would be to refocus from rural location as a key criterion to one based more on income. The rural location criteria could still be a necessary but not sufficient condition. Definitions of "rural area" may also be revisited, but redefining "rural" is not essential to re-target to income rather than "rural" as a sufficient condition for benefit eligibility. Targeting programs based on income may redistribute benefits in a more equitable manner, with greater impacts.

- ***Targeting Based on Net Rural Development Impact.*** Some rural development programs offer benefits to rural areas based on the assumed disadvantages of rural communities and amenities without necessarily determining if needs would be met in the absence of assistance. In some cases, this assumption may not be correct. This type of review should be conducted with respect to all programs. Examples may be where low-interest or guaranteed loans are made but other financing could be obtained, albeit at a somewhat higher rate. While these programs contribute to rural development, the marginal or net contribution of the program is relatively small in those situations. Programs could be re-targeted to circumstances where

goods and services are not available and would not be provided by the private market without government involvement. Better targeting may be achieved if programs were limited to situations where alternative financing is significantly restricted and where goods or services needed for either economic development or an adequate quality of life are not forthcoming without the program's benefits.

Legislation may be considered to inject considerations of net rural development impacts into program targeting. B&I and broadband loan programs are candidates for such consideration. Adjustments could take several forms, including specific competitive considerations in selection criteria, requirements for competitive impact statements in applications, and more detailed analysis of program targeting where the net impacts on rural development are added to the assessments.

- ***Targeting Market-Based Programs on Self-Sustainability.*** Assistance provided under market-based programs is generally offered to businesses or communities with the hope that recipients will use the assistance to become self-supporting and self-sustaining. Other programs are not so restricted. Some are nonbusiness assistance programs whose purposes are not economic development but poverty alleviation. Others support entities that may be able to function without the assistance once the initial assistance has been incorporated into on-going economic activity. Yet others provide benefits to businesses or organizations that could in one way or another function quite as well without government assistance. One targeting alternative would be to direct more assistance into the support of self-sustaining economic development projects and away from those that are either maintenance-oriented or would be self-sustaining without the benefits of the program.

  Self-sustaining economic activity may well continue to require programs oriented toward rural America. In some cases, economic activity in rural areas may naturally lag behind those of urban and industrialized areas, even where such activity may eventually become indistinguishable from similar activities in nonrural areas. The needs for special attention to the supporting infrastructure and amenities enabling rural development is inherent in many programs and can continue under this alternative. Finally, rural development programs should continue to recognize certain comparative advantages in economic development over other areas of the Nation, advantages that can be supported by carefully targeted programs.
- ***Targeting Assistance To Increase Funds Available for Socially Based Programs.*** Under the Credit Reform Act, most socially based rural development programs cost more Federal budget authority to implement than market-based rural development programs. To the extent that rural development issues can be addressed with market-based solutions, which take fewer Federal budget dollars, these Federal dollars can be applied to situations that can only be addressed with more expensive socially based rural development solutions. During the consideration of the farm bill, legislative changes could be made to encourage RD and the people it serves to use market-based rural development solutions where possible reserving the socially based solutions to those situations where rural communities were in most need.

  Further, RD needs flexibility to manage the costs of its programs to stretch the Federal budget authority further to help more people. During the farm bill debate, legislative changes could also be made to give RD more flexibility to operate its programs more efficiently with respect to its use of Federal budget authority.

A more thorough assessment of the economic, environmental, and infrastructure conditions in rural America, coupled with targeted programs, would lead to more efficient and equitable uses of government assistance. For example, a conclusion may be reached that more immediate and needed benefits should be directed to acute community facility or health needs rather than to maintaining existing and prospering utility companies. Similarly, financial support to emerging business enterprises may be found to add more to a community than funding that only supports on-going activities.

Effects on furthering rural development (economic and quality of life). A systematic program to monitor conditions in rural America and study the net impacts of the various programs on rural development would provide

information on (1) the direct and indirect impacts of current programs and (2) the direct and indirect impacts of current programs under new targeting. Any consequent re-targeting would be directed specifically at the most efficient and equitable way to further rural development. Rural development would be enhanced because available funding and services would be directed toward the areas, individuals, and enterprises with greatest need and make the most efficient use of assistance to further subsequent economic development. By encouraging a greater reliance on market-based rural development solutions where possible, rural communities would have a greater stake in the success of the project.

Effects on distribution of assistance. Program-targeting changes may result in three types of redistribution. First, the geographic areas in which benefits flow may change, either relative to rural or more urbanized areas or as a redistribution among communities, counties, and States. Second, the types of recipients may also change. For example, with more emphasis on individuals or on small businesses, these recipients may see greater benefits at the expense of benefits for large business entities currently providing services to rural populations. Third, the types of projects funded may change. Distribution of benefits resulting from alternative targeting may be more oriented toward demonstrated need, although some programs may define need in terms of personal or community assistance while others may define need in terms of the economic activity that a recipient business may generate with assistance. Targeting of funding to socially based programs may also mean that some program participants would be encouraged to seek loan guarantees instead of grants and direct loans for certain types of projects.

The sheer number of programs focused on rural development, and the fact that each program has one or more targets that may be changed in this alternative, precludes specific estimates of payment distribution effects.

Effects on program costs. Few of the alternatives suggested necessarily affect program costs. Total program costs may stay the same even with significant targeting changes. If the same program re-targets benefits to another eligible set of recipients, program costs will not change. Of course, if some programs are diminished as a result of targeting, costs associated with such programs will be reduced. However, if re-targeting shifts benefits to another program or part of a program, overall costs would change little. In the longer run, programs that enhance self-sufficiency and internal self-sustaining economic growth should eventually reduce or eliminate the need for development programming, thus reducing future program costs.

Alternative 2: Focus on New Business Formation Supported With Rural Private Investment

New business formation and expansion of existing business is necessary for growth in rural economic activity and jobs. The increase in activity and employment is not going to come from more farms employing more people; it is going to come from nonfarm business growth. Under this alternative, USDA would recognize new business formation as the core activity to increase rural economic growth and focus on market-based solutions.

USDA would work with State and local governments, regional organizations, as well as other stakeholders to focus on meeting the needs of rural entrepreneurs. These needs range from education to dealing with regulations to establishing relationships with supporting businesses to obtaining financial capital. Some commercial banks will not lend to business start-ups unless equity investors are liable beyond their invested capital. Many rural investors are reluctant to accept such liability. A focus would be on implementing strategies that facilitate investment by rural residents in rural businesses.

This alternative would require, among other things, identifying, aggregating, and assisting many small individual investors to finance critical investments. While small business and micro lending would continue to have a role, under this option, USDA (or some new development funding entity) would focus on facilitating the aggregation of financing for new rural businesses by helping to bring together entrepreneurs with rural communities, banks, potential individual rural investors, and nonrural investors and creating mechanisms to utilize rural wealth to create more wealth.

Restraints on equity-based rural development are not due to a lack of rural equity. For example, the equity of farm businesses exceeds $1.4 trillion and the farm sector debt-to-asset ratio is at a 50-year low, suggesting that some farm businesses have the capacity to invest in rural business formation if inclined to do so. Further, a number of equity

investment opportunities in rural America are emerging which are stemming from the development of alternative energy resources and the fact that the Internet allows an individual to live in rural America, but work globally. Investors are helping provide development opportunities for some rural communities, although some rural residents may not be in a position to take advantage of these opportunities.

One example were rural investors who retained a portion of the wealth of their investments in the programs that financed the electrification of rural America. Under these programs, USDA not only brought electricity to local rural communities, it also encouraged the development of locally controlled rural electric cooperatives to give the local communities a financial and operational stake in these electric systems. Under these programs, these cooperatives have grown to become very valuable assets for rural communities. Rural electric cooperatives reinvest their revenues in the local community and provide a foundation for economic and cultural growth.

This alternative suggests that a next logical step for rural development programs is to move from programs based on subsidized debt financing to development that is at least partially financed by rural people using their own equity.

Effects on furthering rural development (economic and quality of life). USDA's RD mission area has embarked on an effort to simplify the structure and delivery of its programs to relieve the staff and customers in its 800 local offices from unnecessary and overlapping regulations and administrative burden. This alternative would require that effort to continue to enable local staff to assume a larger leadership role in RD mission area activities of their rural communities by helping these communities become more financially and operationally involved in these new investment opportunities. USDA staff would need to overcome the transactions costs inherent in aggregating equity investments of rural residents, team the equity investments and Federal credit with successful entrepreneurs and projects for their area, and help deal with Federal, State and local regulatory and other impediments. Nonrural investment may have to be sought to absorb sufficient risk to obtain bank financing. Activities to generate successful entrepreneurship must extend beyond accessing rural wealth. Capacity building for entrepreneurship may also require education and training, infrastructure development, strategic planning, and establishment of linkages with other businesses across broader areas to access necessary business services. If increased coordination, organization, and targeting of USDA resources are successful, rural citizens would earn a return on their investments and would help generate economic growth and jobs.

Effects on distribution of assistance. Primary tools for generating more investment in rural businesses by rural residents are development of entrepreneurs, coordination and communication, information and analysis, and leveraging Federal resources through increased use of loan guarantees and private sector funding. Because this alternative is market-based, it would direct more assistance toward economically feasible and sustainable new businesses in areas where rural investors are willing to invest their available capital. Thus, this approach may reduce the amount of Federal funds going to areas where investable funds, including equity levels, are low and the rates of equity appreciation are low. These regions may have high concentrations of the most vulnerable rural residents.

Effects on program costs. Pursuing this alternative would not necessarily require increased budget authority or result in reduced budget authority. In recent years, USDA has increased its program levels for rural development without a significant increase in Federal budget authority by shifting toward loan guarantees and away from grants and direct loans. Under this alternative, USDA rural development programs would continue this trend. This alternative addresses the way in which existing resources would be used. For example, legislative restraints may need to be amended to provide the greatest flexibility possible to manage budget resources under the Credit Reform Act to supply the leveraged credit needed to generate rural economic activity. Some assistance would be needed to provide for education and training for rural entrepreneurial capacity building.

Alternative 3: Move Toward Greater Regionalized Assistance.

The farm bill debate has from time to time focused on the structure of USDA's rural development programs. For example, block grants have been considered as a way to redistribute Federal tax receipts as well as to pass some funding decisions from the Federal to the State level. Another

restructuring approach which has garnered interest in recent years involves making more use of regional development strategies when awarding Federal grants and loans. Such a regional approach, it is argued, has more potential for succeeding in today's global economy.

In past years, rural communities competed mainly with their urban counterparts, specializing in products made with relatively low-cost rural labor. Today, facing increased global competition from places with much lower labor costs, many rural communities must rethink their development strategies. Some rural development experts argue that rural communities must band together to make the most of the local region's assets in pursuing a regional development strategy that can potentially provide them with a comparative advantage in today's global economy. To respond to budgetary pressure, USDA must look for ways to help communities provide for themselves in more cost-effective ways. For example, it generally costs less to provide water services on an area or regional basis than to provide separate systems for every community.

Federal policy has already moved in this direction with the creation of new regional and sub-State regional development organizations. For example, the Delta Regional Authority (DRA), created in 2001, funds projects in the lower Mississippi Delta region. Similar to the Appalachian Regional Commission, DRA priorities arise from recommendations of State governors, and assistance goes to local multi-county development organizations (where they exist) which plan and implement the projects.

The DRA was reauthorized in the 2002 Farm Bill. That same legislation authorized three new regional initiatives:

- ***Northern Great Plains Regional Authority***—similar to the DRA.
- ***Rural Strategic Investment Program***—awards assistance competitively to regional investment boards which plan and implement comprehensive regional development strategies.
- ***Multi-jurisdictional Regional Planning Organization Program***—provides assistance to regional organizations that assist local governments and organizations involved in local development.

While these last three regional initiatives were never funded, the regional approach remains an issue for consideration in the 2007 Farm Bill.

This alternative may be used without new Commissions or creating bureaucratic structures by changing regulations of some existing programs to encourage more assistance for projects that are included in the strategic plans of regional development organizations. When awarding assistance or granting approval by regional development organizations, projects that are instrumental to regional development strategies might be given preference points in the selection process.

Effects on furthering rural development (economic and quality of life). Regional approaches may offer several advantages for rural development.

- Local regional development organizations benefit from economies of scale that give them a cost advantage over a single small rural town or county in doing economic development planning and in grant writing. This should enable them to do more strategic planning that may be needed to find a new niche for the local economy, and should increase their likelihood of identifying and obtaining financial assistance to support their strategy.
- Regional development organizations, which would have access to more assistance sources than typical local governments, may be better able to package different assistance streams together to leverage and finance larger, more comprehensive projects.
- Because of their broader geographical focus, regional strategies can make use of a wider variety of development assets (such as infrastructure, educational and financial institutions, etc.) than can individual towns or counties.
- Their broader geographical area is more conducive to some kinds of strategies that are popular today, including the growth of clusters of businesses that locate not just in one town but over an entire region.
- Encouraging collaboration at the regional level might help to reduce costly inter-local competition in bidding up tax incentives for businesses that locate in the region.
- At the regional level, impacts of policies that extend beyond the borders of individual towns or counties (externalities) are likely to receive more attention, leading to development that increases positive externalities (such as from education) and reduces the negative externalities (such as from pollution).

From these arguments, the effects on rural development would appear to be generally positive. Research evaluations have been generally positive of Federal agencies that have significant regional development dimensions, such as the Economic Development Administration (EDA) and the Appalachian Regional Commission. However, the rural development effects from any new initiative would vary depending on the specific initiative. For example, initiatives that provide planning and operational funds to regional development organizations might be expected to have a bigger impact than initiatives that merely gave such organizations special preference in competing for program assistance. Rural development effects would also depend on how much assistance is targeted to regional development strategies, and whether this is new assistance or assistance that is recycled from existing programs, with the latter approach leading to less overall economic impact. One drawback of the regional approach is the potential difficulty of getting more political jurisdictions and geographically dispersed people to work effectively together.

Effects on distribution of assistance. Distributional effects depend on the type of regional initiative. For example, if the focus is on particular regions of the country, like the DRA or the proposed Northern Great Plains Regional Authority, the impacts will focus on those regions rather than being spread over the country. The rules governing the regional authorities will affect other distributional aspects, such as how assistance is targeted within the region: rural versus urban, high-income versus low-income, and population growth versus population decline.

One of the arguments behind empowering local regional development organizations is that smaller rural communities that have little grant-writing capacity to attract Federal funds might do better when represented by regional organizations backed by RD mission area program assistance. However, not all small communities will fare equally well, since their receipt of assistance under such programs will depend on whether they play an important role in the regional development strategy. Even if they do not receive much of this assistance, however, they may benefit if the strategy produces jobs and income that they can obtain by commuting to regional growth centers.

Effects on program costs. The impact on program costs will depend on the specific initiative(s). For example, the Delta Regional Authority received $6 million in Federal funds in 2006. The more established Appalachian Regional Commission received about $65 million. These cost differences suggest that when creating a new regional program, costs might initially be quite small but they may rise over time, eventually leveling off at a higher level of assistance. The 2002 Farm Bill authorized $30 million for its proposed Northern Great Plains Regional Authority. The authorized amounts for the other two farm bill initiatives were $100 million for the Rural Strategic Investment Program and $30 million for the Multi-jurisdictional Regional Planning Organizations program. Although these 2002 initiatives were not funded, these amounts indicate the potential scale of program costs for similar regional initiatives in the future. In contrast to these initiatives, if existing program money is merely retargeted by regulation, no new assistance would be required.

VI Suggestions for Further Reading

The following is a list of selected USDA publications related to the issues raised in this paper.

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U.S. Department of Agriculture. Economic Research Service. "Population, Income, Education and Employment, State Fact Sheets: United States." June 2006. **http://www.ers.usda.gov/statefacts/US.htm**

APPENDIX. Rural Development — Housing and Community Facilities Programs

PROGRAM	OBJECTIVE	APPLICANT	USES	POPULATION	LOAN/GRANT	TERMS/CONDITIONS
Single Family Home Ownership Direct Loans (Section 502)	Safe, well-built, affordable homes for rural Americans.	Families and individuals. Apply to Rural Development.	Buy, build, improve, repair or rehabilitate rural home as the applicant's permanent residence.	Rural areas with populations of 20,000 or less.	Direct loan.	Up to 100 percent of market value or cost, whichever is less. Loan amortized for 33/38 years. Applicant may be eligible for payment assistance (subsidy) on the loan.
Single Family Home Ownership Guaranteed Loans (Section 502)	Assist eligible applicants in buying their homes by guaranteeing loans made by private lenders.	Families and individuals. Apply to lender.	Purchase new or existing home.	Rural areas with populations of 20,000 or less.	Loan guarantee.	30 year, fixed rate. Interest rate negotiated between lender and borrower. Loans to 100 percent of market value.
Single Family Home Ownership Direct Repair Loans and Grants (Section 504)	To help very-low-income homeowners remove health and safety hazards or to repair their homes.	Families and individuals who currently own their home. Apply to Rural Development.	Repair or replace roof, winterizing, purchase or repair of heating system, structural repair, and water and sewage connect fees, and similar uses.	Rural areas with populations of 20,000 or less.	Direct loan and grant.	Loan terms to 20 years at 1 percent. Assistance to individual may not exceed $20,000. Grants only available to very-low-income applicants 62 years or older who cannot afford to pay 1 percent loan.
Mutual Self-Help Housing Grants (Section 523)	Assist lower income families in building their own homes.	Non-profits and public bodies.	Technical assistance to qualify and supervise small groups of families to build each other's homes.	Rural areas with populations of 20,000 or less.	Grant.	Grant agreement.
Rural Rental Housing Direct Loans (Sections 515)	Safe, well-built, affordable rental housing for very-low, and low income individuals and families.	Individuals, limited profit and non-profit organizations. Apply to Rural Development.	New construction or rehabilitation of rental housing.	Rural areas with populations of 20,000 or less.	Direct loan.	Up to 100 percent of total development cost (non-profits); 97 percent (for-profits). 30-year term with up to 50 year amortization. For for-profit organizations with Low-Income Housing Tax Credits, 95 percent of total development costs.
Rural Rental Housing Guaranteed Loans (Section 538)	Safe, well-built, affordable rental housing for low to moderate income individuals and families.	Individuals, partnerships, limited liability companies, trusts, state and local agencies and Indian Tribes. Apply to lender.	New construction or substantial rehabilitation of rural rental housing.	Rural areas with populations of 20,000 or less.	Loan guarantee.	Up to 90 percent loan to value for loans made to for-profit entities, and up to 97 percent loan to value for loans made to non-profit entities. Repayment terms are 25 to 40 year amortization.
Housing Preservation Grants (Section 533)	Repair and rehabilitate housing owned or occupied by very-low- and low-income rural families.	Public bodies and non-profit organizations. Apply to Rural Development.	Operation of a program which finances repair and rehabilitation activities for single family and small rental properties.	Rural areas with populations of 20,000 or less.	Grant.	Grant agreement.
Farm Labor Housing (Sections 514 & 516)	Safe, well-built affordable rental housing for farm workers.	Individuals, public and private non-profit organizations. Apply to Rural Development.	New construction or substantial rehabilitation of rental housing.	No population restriction.	Direct loan and grant.	Up to 102 percent of total development cost. Up to 33 years to repay at 1 percent interest.
Community Facilities (Faith-Based and First Responder)	Provide essential community facilities for rural communities.	Public bodies, non-profit organizations, and Indian tribes. Apply to Rural Development.	Build facilities and purchase equipment for fire and rescue, early warning systems, police stations, health clinics, schools, libraries, hospitals, etc.	Rural areas with populations of 20,000 or less.	Direct loan or loan guarantee, grant.	Up to 100 percent of market value. Up to 40 years or life of security. Maximum grant 75 percent of project cost.

Direct Loans and Grants - Apply to Rural Development. Loan Guarantees - Apply to intermediary (approved banks, mortgage companies) Revised June 01, 2006

APPENDIX. Rural Development — Business and Cooperative Programs

PROGRAM	OBJECTIVE	APPLICANT	USES	POPULATION	LOAN/GRANT	TERMS/CONDITIONS
Business and Industry Guarantee Loans	Create jobs and stimulate rural economies by providing financial backing for rural businesses.	Businesses. Apply through Federal or State chartered banks, credit unions, or savings & loan associations.	Most legal business purposes except production agriculture. Include acquisition, start-up and expansion of businesses that create rural employment.	Any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town.	Loan guarantee.	Lender and borrower negotiate terms. Interest rate tied to published rate that may change no more often than quarterly.
Intermediary Relending Program Loans	Finance business facilities and community development projects in rural areas.	Public bodies, non-profit corporations, Native American tribes, and cooperatives. Apply to Rural Development.	Community development projects, establishment or expansion of businesses, creation or saving of rural jobs.	Rural areas and incorporated places with populations of less than 25,000.	Direct loan.	The intermediary makes loans to businesses from its revolving loan fund on terms consistent with security offered. Intermediary pays 1 percent for 30 years.
Rural Business Enterprise Grants	Finance and facilitate the development of small and emerging private business enterprises.	Public bodies, private non-profit corporations, and federally recognized Native American tribal groups. Apply to Rural Development.	Buy and develop land, establish a revolving loan fund, construct buildings, plants, equipment, access streets and roads, parking areas, utility and service extensions, and rural distance learning networks.	Any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town.	Grant.	When grant funds are used for revolving loan fund (RLF), the intermediary makes loans to businesses from its RLF on terms consistent with security offered.
Rural Business Opportunity Grants	Finance technical assistance for business development and conduct economic development planning in rural areas.	Public bodies, non-profit corporations, Indian tribes on Federal or State reservations, and cooperatives with members that are primarily rural residents.	Technical assistance, leadership training, establishment of business support centers, economic development plans.	Any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town.	Grant.	Must be completed within 2 years after project has begun.
Rural Economic Development Loans and Grants	Finance economic development and job creation in rural areas.	Electric and telephone utilities eligible for financing from the Rural Utilities Service. Apply to Rural Development.	Promote rural economic development and/or job creation projects including feasibility studies, startup costs, and business incubators.	Rural areas and places with populations of 2,500 or less.	Direct loan and revolving loan fund grant.	The intermediary (electric or telephone utility) makes loans to profit or non-profit business and public bodies for rural economic development and/or job creation projects. Loans are 0 percent for 10 years.
Rural Cooperative Development Grants	Establish and operate centers for cooperative development to improve the economic condition of rural areas through the development of new cooperatives and improving operations of existing cooperatives.	Non-profit corporations and institutions of higher education. Apply directly to Rural Development National Office.	To conduct feasibility studies, business plans, and applied research as well as provide training and other technical assistance to new and existing cooperatives and businesses.	Any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town.	Grant.	Applicants must meet specific selection criteria including a minimum 25 percent fund match. Grants are awarded on a competitive basis.

Value-Added Agricultural Product Market Development Grants	Assist independent agricultural producers to enter into activities that add value to their commodities.	Independent producers, farmer and rancher cooperatives, agricultural producer groups, and majority-controlled producer-based business ventures. Apply directly to Rural Development National Office.	Planning purposes such as conducting feasibility studies or business plans; or as working capital to help start the operations of a venture.	No population restriction	Grant	Applicants must meet specific selection criteria. Grants are awarded on a competitive basis. Funds cannot be used to build facilities or purchase equipment. Funds must be matched on a dollar-for-dollar basis.
Small Minority Producer Grants	Technical Assistance	Cooperatives or associations of cooperative whose primary focus is to provide assistance to small, minority producers and whose governing board and/or membership is comprised of at least 75 percent minority.	To conduct technical assistance such as market research, product and/or service improvement; legal advice and assistance; feasibility study, business plan and marketing plan development; and training.	All areas except cities of more than 50,000 and their contiguous and adjacent urbanized areas.	Grant.	Applicants must meet specific selection criteria and grants are awarded on a competitive basis. Funds are to be use only for Technical Assistance. There are no matching requirements for this program.
Renewable Energy Systems and Energy Efficiency Improvements Loans and Grants	Finance the purchase of renewable energy systems, and make energy improvements.	Agricultural producers and rural small businesses.	Construction or improvements, purchase and installation of equipment, energy audits, permit fees, professional service fees, business plans, feasibility studies.	Any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town.	Loan guarantee and grant.	Applicants must meet specific selection criteria. Loans cannot exceed 50 percent of eligible project costs. Grants are awarded on a competitive basis. Grant cannot exceed 25 percent of eligible project costs.
Biomass Research and Development Initiative	Finance the research and development of biomass based products, bioenergy, biofuels, and related processes.	Institutions of higher education, National laboratories, Federal or State research agencies, private sector entities, and non-profit organizations.	Research and development of biomass based products, bioenergy, biofuels, and related processes.	No population restriction.	Grant.	Applicants must meet specific selection criteria. Grants are awarded on a competitive basis. A minimum of 20 percent cost sharing requirements apply, and may be up to 50 percent depending on nature of project. Cost share must come from non-Federal sources.

Direct Loans and Grants - Apply to Rural Development. Loan Guarantees - Apply to intermediary (eligible banks, etc). Revised June 01, 2006

APPENDIX. Rural Development — Utilities Programs

PROGRAM	OBJECTIVE	APPLICANT	USES	POPULATION	INSTRUMENT	TERMS/CONDITIONS
Water and Waste Disposal Loans and Grants	Provide water and waste financing in rural areas to the most financially needy applicants resulting in reasonable user fees.	Public entities, Indian tribes, and non-profit corporations. Apply to Rural Development.	Build, repair, and improve public water systems, and waste collection and treatment systems. Also other related costs.	Rural areas, cities, and towns with up to 10,000 population.	Direct loan and grant.	Interest rates are set quarterly based on an index of current market yields for municipal obligations. Repayment period is a maximum of 40 years. Grant funds may be available.
Water and Waste Disposal Loan Guarantees	Provide loan guarantees to lenders serving financially needy applicants.	Public entities, Indian tribes, and non-profit corporations. Apply to Rural Development.	Construct, repair, modify, expand, improve water supply and distribution systems, and waste collection and treatment systems. Also other related costs.	Rural areas, cities, and towns with up to 10,000 population.	Loan guarantee.	Eligible lenders obtain up to a 90 percent guarantee on loans they make and service. Lenders should contact Rural Development Area or State Office.
Solid Waste Management Grants	Provide technical assistance and/or training to help communities reduce or eliminate pollution of water resources and improve planning and management of solid waste sites.	Non-profit organizations and public bodies. Apply to Rural Development.	Provide technical assistance and training to reduce pollution of water resources and improve management of solid waste facilities.	Rural areas, cities and towns with up to 10,000 population.	Grant.	Projects are funded based on selection at the National level. Applications are accepted from October 1 to December 31 of each year.
Rural Broadband Loans and Loan Guarantees	The deployment of broadband service to eligible rural communities.	Legally organized entities providing or proposing to provide broadband service in eligible rural communities. Cannot serve more than 2 percent of the telephone subscriber lines installed in the U.S.	The construction, acquisition, and improvement of broadband transmission facilities and equipment; land and buildings used in providing broadband service; and the refinancing of Telecommunications Program debt.	Eligible rural communities with a population of 20,000 inhabitants or less.	Direct loan and loan guarantee.	Loans are made at the Treasury rate of interest at the time of the advance for a period equal to expected composite economic life of the assets financed. Loans are guaranteed at the interest rate set by the private lender for no more than 80 percent of the principal amount.
Electric and Telecommunications Loans and Guarantees	Provide financial aid through direct and guaranteed loans for electric and telecommunications services.	For profit entities, non-profit and cooperative associations, public bodies, and other utilities. Apply directly to Rural Development National Office.	Generation, bulk transmission facilities, and distribution of electric power. Enhance 911 emergency service, digital switching equipment, fiber optic cable, along with traditional main system telecommunications service and broadband services.	Electric: Rural areas as defined by the U.S. Census. Telecommunication: Rural areas with populations of 5,000 or less.	Direct loan and loan guarantee.	Interest rates are established in accordance with 7 CFR 1745.
Distance Learning and Telemedicine Loans and Grants	Development and deployment of advanced telecommunication services throughout rural America to improve education and health care.	Incorporated entities, including municipal corporations, on a for profit or not-for-profit basis, that operate rural schools, libraries, health care clinics and other organizations that operate educational or health care facilities.	Equipment for classrooms: cameras, video monitors, computers, and LAN. Also for physician consultation, radiology, ex-ray scanners, and digital microscopes.	Rural areas with populations of 20,000 or less.	Direct loan and/or grant.	Matching funds are required.

Direct Loans and Grants - Apply to Rural Development. Loan Guarantees - Apply to intermediary (eligible banks, etc). Revised June 01, 2006

Energy and Agriculture

Introduction

This paper is the fourth in a series of briefing papers that assess general themes advanced at the 2007 Farm Bill Forums held during 2005 by Secretary Mike Johanns as well as related issues that have emerged in recent months. Energy has been selected for a 2007 Farm Bill theme paper because of the relationship between energy, agriculture, and rural areas. This paper describes the current role of U.S. agriculture in energy production and efforts to conserve energy use in agriculture, discusses and evaluates energy programs administered by the Department of Agriculture (USDA), and concludes with a discussion of general policy approaches associated with energy and agriculture. The alternatives represent generalized approaches to addressing the key issues that have been raised with regard to energy and agriculture. The alternatives are not recommendations but are presented to further discussion on the 2007 Farm Bill.

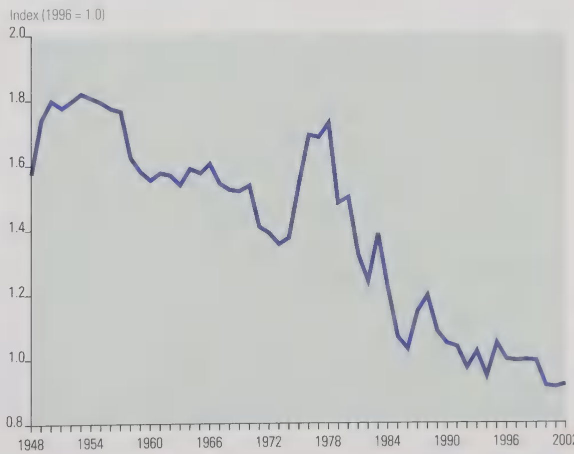
Background: Energy and U.S. Agriculture

Agriculture is a major user of energy, with direct energy consumption and indirect energy use through production inputs, such as fertilizer, accounting 15 percent of total farm cash production expenses. In addition, agriculture has the potential to become an increasingly important source of renewable energy and to provide significant economic opportunities for farmers and ranchers. Renewable energy production stimulates the agricultural and rural economy, improves the environment, and enhances national energy security. The most effective government policies that have expanded renewable energy production are nonagricultural policies (i.e., Energy Tax Act of 1978 and the Energy Policy Act of 2005). Most agriculture-related policy has centered on food and feed supply availability. This section discusses recent trends in energy use in agriculture, renewable energy production opportunities, the policies that have helped foster those opportunities, and the prospects for renewable energy markets.

Trends in Energy Use in Agriculture

Agriculture uses energy directly for operating machinery and equipment on the farm and indirectly in the fertilizers and pesticides produced off the farm. Energy use by agriculture peaked in 1978. However, rapidly rising energy prices caused by oil price shocks in the early 1980s forced farmers to become more energy efficient. Since 1978, the total energy use by the agricultural sector has fallen. Even though energy use has decreased, agricultural output has increased since the late 1970s. One measure of energy efficiency, the ratio of energy use to agricultural output, has fallen by about 50 percent since 1978 (Figure 1).

FIGURE 1. Energy Use per Unit of Farm Output



While both agricultural and fertilizer production have made significant improvements in energy efficiency over time, energy-related expenditures (electricity, fuels and oils, and fertilizers) make up an important share of total production expenses. Energy-related expenses rose from about 5 percent of total farm cash expenses in 1910 to over 17 percent of total farm cash expenses in the early 1980s. Since the early 1980s, improvements in efficiency and relatively stable nominal energy prices caused the share of energy-related expenses as a share of total farm cash expenses to fall to about 11 percent by 2003. However, due to increasing energy prices, the share of energy-related expenses as a share of total farm cash expenses rose in 2005 and is forecast to increase again in 2006. For 2005, energy-related expenses are estimated to account for 14 percent of total farm cash expenses, or $27.4 billion, including expenses of $12.8 billion for fertilizer, $11.2 billion for fuels and oils, and $3.4 billion for electricity. With expenses for fertilizer, fuels and oils, and electricity continuing to increase, energy-related expenses are forecasted to climb to $29.9 billion in 2006, 15 percent of total farm cash expenses and 50 percent above the level in 2003.

From the mid-1960s through 1981, commercial fertilizer use doubled, reaching a peak of over 23 million nutrient tons. Since the early 1980s, commercial fertilizer use has remained at about 22 million tons. In the short run, farmers may be able to reduce energy use by switching from conventional tillage practices to reduced or no-till, reducing fertilizer application rates, improving nutrient management practices that reduce nutrient losses, increasing the use of animal manure as a substitute for commercial fertilizers, or switching to crops that use less fertilizer and other energy-related inputs. Over the long term, farmers have considerable flexibility in reducing their energy use by acquiring more energy-efficient equipment and making other changes to their farming operation. The adoption of precision farming practices (yield monitoring global positioning systems and calibrated application of pesticides and fertilizers) enable producers to use less fertilizer and other production inputs without adversely affecting crop yields. The combined effects of more energy-efficient equipment and practices along with changes in crops produced and yields has allowed agriculture to become more energy efficient over the past 50 years.

Renewable Energy Production Today

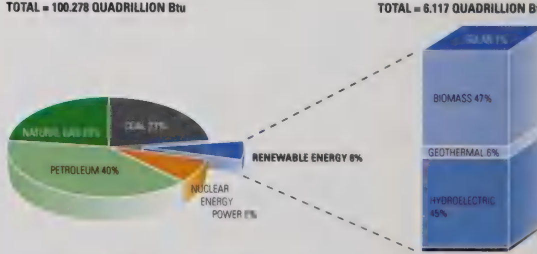
Since the energy crisis of the 1970s, developing new energy sources from the agricultural sector has been viewed as a way to expand the domestic energy supply and help mitigate our growing dependence on imported oil. Including hydropower, renewable energy accounted for 6 percent of U.S. energy consumption in 2004, with energy from biomass contributing almost half of that total (Figure 2). Biomass energy is primarily produced from wood (70 percent) followed by waste (20 percent) and alcohol fuels (10 percent). While wood has provided most of the biomass energy over the years, ethanol has been the fastest growing renewable energy source over the past 10 years. Ten years ago ethanol's share of biomass energy was less than 4 percent.

Government incentives encouraged investment in the ethanol industry and production grew rapidly throughout the 1980s and 1990s (Figure 3). In 2005, the ethanol industry produced 4 billion gallons of ethanol which is blended in 30 percent of the Nation's gasoline.

Biodiesel, which is just beginning to establish a market in the United States, is a biofuel substitute for petroleum diesel (Figure 4). Biodiesel is most commonly blended with diesel fuel at levels of 20 percent or lower. The majority of the 91 million gallons of biodiesel produced in 2005 came from soybean oil, although it can also be made from other oilseed crops, animal fats, and grease.

The U.S. Department of Energy's (DOE) Energy Information Administration (EIA) estimates that the United States consumes about 140 billion gallons of gasoline and 60 billion gallons of diesel fuel per year. Therefore,

FIGURE 2. The Distribution of Renewable Energy Consumption in the United States, 2004 [1/]



Source Department of Energy, Energy Information Administration
1/Total may not reach 100 percent due to rounding

in terms of their relative contribution to meet our transportation fuel needs, ethanol production met about 3 percent of gasoline consumption in the United States while biodiesel production met 0.15 percent of diesel fuel consumption in 2005.

In addition to ethanol and biodiesel, biomass and animal wastes can be used to produce renewable energy. Biomass is used to generate electric power by direct burning, using gasification systems, or mixing biomass with coal in coal-fired electrical generation facilities. The primary feedstocks include wood waste used by the pulp and paper industry for industrial heat and steam production. In addition, forest residues and municipal solid waste are used to generate electricity. Another potentially large source of renewable energy is animal waste which can be turned into methane gas through anaerobic digestion. Anaerobic digesters are being adopted by commercial livestock operations not only to produce energy, but also to meet new state and Federal regulations for controlling animal waste. Currently, there are over 90 anaerobic digester projects, either in operation or under construction, located throughout the United States. Nearly all the anaerobic digesters are associated with dairy operations, with a few associated with swine or poultry operations.

FIGURE 3. **U.S. Annual Ethanol Production, 1980 - 2005**

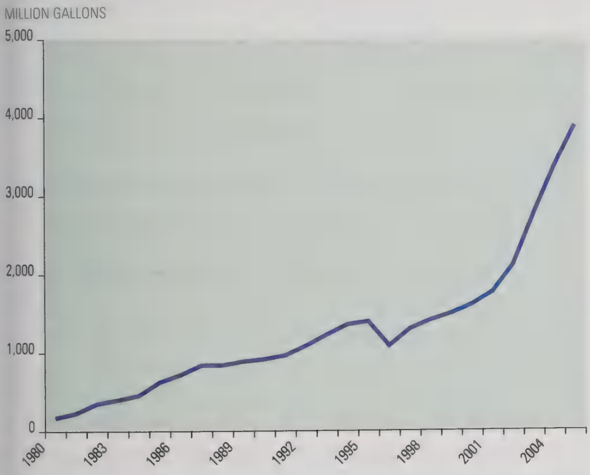
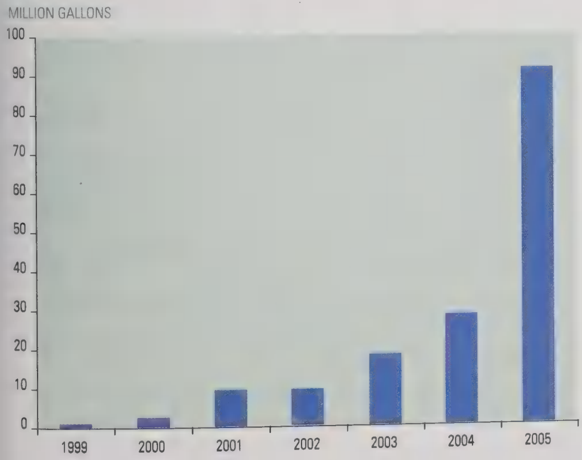


FIGURE 4. **U.S. Annual Biodiesel Production, 1999 – 2005**



Another emerging approach to reducing U.S. fossil energy use is to replace petroleum-based products with products made from biomass. There are many industrial and consumer products that have been traditionally made from biomass, including yarns and fabrics, soaps and detergents, pulp and paper, lubricants and greases, and adhesives and paints. However, agricultural feedstocks can be used to produce nontraditional products such as chemicals, plastics, hydraulic fluids, and pharmaceuticals. There are many agricultural feedstocks that can be used to make bioproducts, including a variety of crops, wood and plant oils, and agricultural and forestry residues. Bioproducts often require less energy to produce than the fossil and inorganic products they replace. With the increasing costs of fossil fuels, U.S. industries have an increased incentive to consider and produce alternative bioproducts. As examples of new biobased technology, corn starch is being used to produce bioplastic products, and soybeans are being used to produce a polymer used to manufacture carpet backings. The chemical industry could potentially offer a large market for numerous high-value biobased chemicals and other materials made from agriculture.

Progress is also being made in developing energy from solar, wind, and geothermal resources although the amount of energy from these sources is relatively small. Small-scale solar applications are already commercially available that provide electricity for lighting, battery charging, water pumping, and electric fences. There also has been an emergence of large-scale solar technology that is being used in homes and in the industrial sector. Small-wind systems are currently being developed to generate electricity in remote areas and utility-size turbines have been increasing in num-

bers, especially on farms in areas with consistently high wind speeds. More geothermal resources are being tapped to produce electrical or thermal energy in local areas. There are many agricultural applications for geothermal energy, including heating greenhouses, providing warm water for aquaculture operations, and drying produce.

Although ethanol growth has been impressive in recent years, ethanol accounts for about 3 percent of total annual gasoline consumption. About 14 percent of the U.S. corn crop was used for ethanol in 2005/06 and USDA projects 20 percent of U.S. corn production will be converted into ethanol in 2006/07. Clearly, the supply of corn is relatively small compared to gasoline demand, so other domestic sources of renewable energy must be developed to replace oil imports if the U.S. is to greatly reduce its dependence on imported oil. Biodiesel can extend the diesel fuel supply, but the supply of oil crops, animal fats, and other feedstocks is also relatively small compared to the diesel fuel market. Research may provide technological breakthroughs leading to a significant expansion in ethanol production. In the near future, ethanol's feedstock base could expand significantly with the advancement of technology that could economically convert switchgrass and other low-valued biomass into cellulosic ethanol.

Legislative and Regulatory Incentives

Growth in renewable energy over the past two decades is largely due to government legislation and regulations. There have been several motivations behind renewable energy legislation, including enhancing national energy security, improving the environment, and stimulating the agricultural economy.

Energy Policy. Much of the growth in corn ethanol production can be attributed to government incentive programs that began in the 1970s. The Energy Tax Act of 1978 authorized the motor fuel excise tax exemption for ethanol blends, providing ethanol blends of at least 10 percent ethanol by volume a $0.40 per gallon exemption from the Federal motor fuels tax. Since then, several statutes have extended the tax exemption for ethanol. Currently, Federal law authorizes a tax credit of $0.51 per gallon for ethanol through 2010. Legislation has also been passed to give income tax credits and loan guarantees to small ethanol producers.

The American Jobs Creation Act of 2004 granted biodiesel blenders a tax credit of $1.00 per gallon of biodiesel made from oil crops and animal fats and a $0.50 per gallon tax credit for biodiesel made from recycled fats and oils. Largely due to this tax credit and other government incentives, biodiesel production grew from about 500,000 gallons in 1999 to 91 million gallons in 2005. Legislation has also created tax credits for biomass, wind energy, and other renewable energy sources used to generate electricity.

The Energy Policy Act (EPACT) of 2005 included several provisions to help diversify domestic energy production through the development of renewable fuels. EPACT mandates a renewable fuel phase-in called the renewable fuels standard (RFS), requiring U.S. fuel production to include a minimum amount of renewable fuel each year, starting at 4 billion gallons in 2006 and reaching 7.5 billion gallons in 2012. EPACT also created the Cellulosic Biomass Program to encourage the production of cellulosic ethanol and fund research on conversion technology. Under this program, every 1 gallon of ethanol made from biomass, such as switchgrass, crop residues, and tree crops, counts as 2.5 gallons towards satisfying the RFS. EPACT also extended the biodiesel fuel excise tax credit through 2008 and authorized a $0.10 per gallon income tax credit to small biodiesel producers.

Environmental Policy. There is a significant opportunity to reduce air pollution and greenhouse gas (GHG) emissions by replacing fossil energy with renewable energy. Ethanol was first used as a fuel additive in the late 1970s when the Environmental Protection Agency (EPA) began phasing out lead in gasoline and ethanol replaced lead as an octane enhancer. Provisions of the Clean Air Act Amendments of 1990 (CAA) established the Oxygenated Fuels Program and the Reformulated Gasoline (RFG) Program to control carbon monoxide and ozone problems created by motor fuels. Refiners blended cleaner burning oxygenates into gasoline to meet the new standards. Ethanol and a petroleum-based additive called methyl tertiary butyl ether (MTBE) became the two oxygenates most commonly used to meet the requirements mandated by the CAA. The use of MTBE is currently being phased out and replaced with ethanol after MTBE was found to contaminate drinking water. Recently adopted EPA diesel fuel standards that require refiners to remove most of the sulfur from diesel fuel could increase biodiesel demand.

Since biodiesel contains no sulfur and is an excellent lubricity agent, refiners could blend biodiesel with petroleum diesel to help meet the new standards.

Agricultural Policy. Agricultural policy has only recently been directed at energy conservation and renewable energy production. USDA's FY 2000 Appropriations Act authorized the establishment of pilot projects for harvesting biomass on lands enrolled in the Conservation Reserve Program (CRP). In 2000, USDA also initiated the Commodity Credit Corporation (CCC) Bioenergy Program to alleviate crop surpluses and stimulate production of biofuels. The Agricultural Risk Protection Act of 2000 included the Biomass Research and Development Act, which directed the USDA and DOE to cooperate and coordinate polices to promote research and development leading to the production of bioproducts.

The Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) contained the first energy title in farm bill history. The 2002 Farm Bill energy title authorized a range of programs through 2007 to promote bioenergy and bioproduct production and consumption. Key provisions include the Federal Biobased Products Preferred Procurement Program (FB4P), which requires Federal agencies to procure biobased products. Another program, the Biodiesel Fuel Education Program, awards competitive grants to educate government and private entities with vehicle fleets about the benefits of biodiesel fuel use. The Renewable Energy Systems and Energy Efficiency Improvements Program authorizes loans, loan guarantees, and grants to assist eligible farmers, ranchers, and rural small businesses in purchasing renewable energy systems and making energy efficiency improvements. The Value Added Grant Program (VAGP) was amended to make funds available to farm families and rural businesses to help them develop new value-added products, such as ethanol and biodiesel. The 2002 Farm Bill extended the CCC Bioenergy Program through FY 2006, expanded the CRP pilot biomass authority to a nationwide general authority, and authorized placement of wind turbines on land enrolled in CRP.

State Programs. There are also many State programs that encourage renewable energy use through tax credits, production incentives, and biofuel mandates. One of the first States to actively promote biofuels was Minnesota, which has consumption mandates for ethanol and biodiesel. Minnesota's 2-percent biodiesel mandate, which became effective in 2004, created a 16-million-gallon market for biodiesel. Almost every State has at least one renewable energy promotion program in place, and most have several.

Another important policy tool at the State level is a Renewable Portfolio Standard (RPS). A RPS is a policy that obligates a retail electricity supplier to include renewable resources in its electricity-generation portfolio and creates a demand for renewable energy sources. Retail suppliers can meet the obligation by constructing or owning eligible renewable resources or purchasing the power from eligible generators. To date, 20 States plus Washington, D.C., have adopted RPS policies or renewable purchase obligations, while several other States have adopted non-binding renewable energy goals. A number of States have increased their renewable energy standards in recent years. The Union of Concerned Scientists projects that State RPS laws and regulations will provide support for nearly 31,100 megawatts (MW) of new renewable power by 2017—an increase of 230 percent over total 1997 U.S. levels (excluding hydroelectric).

Market Prospects

Over the years, government incentives have been necessary to help ethanol and biodiesel compete with less costly petroleum-based fuels. However, the recent surge in oil prices has made biofuels much more cost competitive and these industries are attracting new investment. The number of biodiesel plants is growing rapidly due to government incentives and high diesel fuel prices – the number of plants increased from fewer than 10 in 2000 to 65 in 2006, with an annual industry capacity of 395 million gallons. Another 58 plants are under construction or in the process of expansion, adding another 318 million gallons of capacity upon completion. Ethanol production has also been growing rapidly. In 2000, there were 54 plants with capacity of about 1.75 billion gallons per year. Currently, there are over 100 ethanol plants with a combined production capacity of over 4.5 billion gallons a year. An additional 30 ethanol plants under construction are expected to add annual capacity of more than 2 billion gallons.

Ethanol and biodiesel production will continue to expand as long as government incentives continue and world petroleum prices remain high. World oil prices have increased sharply since 1999, when the annual average nominal price of West Texas Intermediate (WTI) oil jumped from $19.25 per barrel to $30.29 in 2000 (Figure

5). Between 2000 and 2003, the average WTI price ranged from about $26 per barrel to $31 per barrel. In 2004, the WTI price increased to over $41 per barrel and the 2005 average WTI price increased to over $56 per barrel. EIA short-term projections indicate that the average WTI price for a barrel will climb to $69 in 2006 and remain at that level in 2007.

Higher crude oil prices have translated into higher wholesale and retail prices for gasoline and diesel fuel. EIA estimates that the average wholesale price for gasoline increased from $1.28 per gallon in 2004 to $2.04 per gallon in 2006. With cash and net feedstock costs for ethanol at about $1 per gallon, ethanol was not competitive with gasoline at 2004 prices without the income tax credit. However, with the recent increase in gasoline prices, corn-based ethanol is competitive with gasoline without the income tax credit.

Under EIA's long-term forecast, the real price of imported oil is expected to level off after 2007 and perhaps show a slight decline by 2010. Nevertheless, world oil supplies are expected to remain tight as the demand for oil remains strong, keeping pressure on oil prices through 2030. If future oil prices reflect EIA projections, biodiesel and ethanol production will continue to grow with the rate of growth depending on the level of oil prices, feedstock costs, and changes in technology.

In the longer term, EIA expects domestic energy consumption to continue to grow (Table 1). By 2030, EIA forecasts that U.S. energy consumption will increase by over 30 percent, from 100 quadrillion Btus currently to 134 quadrillion Btus in 2030. Therefore, the supply of renewable energy must also increase by 30 percent over the same time just to maintain its current share of the overall energy market and expand further to reduce fossil-fuel dependence. The growth in energy consumption to meet the needs of the transportation sector is expected to increase by over 40 percent from 2005 to 2030.

While domestic energy production will also increase over time, EIA forecasts that imported energy will rise more rapidly (Table 2). While domestically produced energy is projected to increase by about 25 percent, from 71 quadrillion Btus in 2005 to 89 quadrillion Btus in 2030; energy imports are projected to increase by almost 50 percent, rising from 30 quadrillion Btus in 2005 to 44 quadrillion Btus by 2030. As a result, the share of U.S. energy use met by imported sources is projected to rise from 30 percent currently to 33 percent by 2030.

FIGURE 5. **Annual Average and Forecasted U.S. Crude Oil Prices, 1971 - 2007**

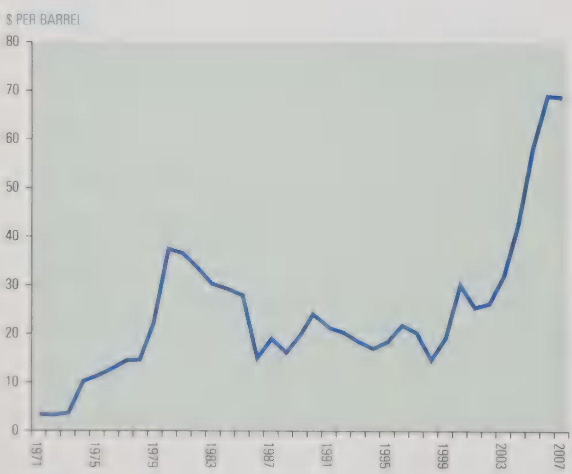


TABLE 1. **Projected Energy Consumption 2005-30**

	2005	2010	2015	2020	2025	2030
ENERGY CONSUMPTION *(By Sector)*			*Quadrillion Btu*			
Residential	22	23	24	25	26	27
Commercial	18	20	21	23	25	27
Industrial	33	35	36	37	39	41
Transportation	28	31	33	36	38	40
Total	**101**	**108**	**114**	**121**	**127**	**134**

Source: Department of Energy, Energy Information Administration. Totals may not add due to rounding.

TABLE 2. **Projected Energy Supply, 2005-30**

	2005	2010	2015	2020	2025	2030
ENERGY SUPPLY			*Quadrillion Btu*			
Domestic Production	71	77	81	84	87	89
Net Imports	30	30	33	36	40	44
Total	**101**	**108**	**114**	**121**	**127**	**134**

Source: Department of Energy, Energy Information Administration. Totals may not add due to rounding.

USDA's Renewable Energy and Energy Efficiency Programs

USDA's Natural Resources Conservation Service (NRCS) has several programs that affect energy use on farms and ranches. These programs include the Conservation Security Program (CSP), the Environmental Quality Incentives Program (EQIP), Conservation Technical Assistance (CTA), as well as other programs.

Energy conservation and the conservation of natural resources by farmers and ranchers are complementary and many conservation measures significantly reduce fuel and other energy-related costs. Conservation practices such as crop residue management, irrigation water management, nutrient management, wind breaks, contour farming, and rotation grazing, among others, can contribute to protecting soil and water resources and reduce energy use. In addition, the growing availability of precision agriculture has the potential to reduce energy use significantly as well as protect and enhance water quality and other environmental amenities.

During the past couple of decades, NRCS has helped farmers adopt no-till practices on about 62 million acres of cropland. Assuming an average savings of 3.5 gallons per acre in diesel fuel, this amounts to a savings of 217 million gallons of diesel fuel per year with a cost savings to farmers of about $500 million per year.

In FY 2004, with technical and financial assistance from NRCS, farmers and ranchers applied nutrient management on 2.9 million acres and pest management on 3.5 million acres. Improved application, timing, and placement of nitrogen fertilizer can save farmers from $10 to $20 per acre. Assuming average savings in nitrogen fertilizer costs of $15 per acre, the cost savings to farmers from the nutrient management practices adopted in FY 2004 would amount to just over $43 million per year.

Air quality concerns associated with agricultural production include odors, ozone precursors, ammonia, particulate emissions, and greenhouse gases. Addressing these concerns is an area of increasing emphasis in USDA's conservation programs. Livestock producers enrolled in EQIP can receive cost-share assistance for installing anaerobic waste digesters. These technologies significantly reduce odors associated with large animal feeding operations and, in many cases, can result in significantly lower methane emissions. NRCS has provided technical and financial assistance to help producers install at least 40 anaerobic digesters. Although some produce electricity either for on-farm use or for sale to electric utilities, there is a growing interest in using the methane directly on the farm to power equipment, heat buildings, and provide for other on-farm uses.

Under EQIP, NRCS also offers innovation grants to accelerate the development, transfer and adoption of innovative technologies and approaches, including those related to energy. In FY 2006, NRCS awarded $20 million in Conservation Innovation Grants (CIG), of which $7.4 million (37 percent) was awarded to proposals that addressed energy conservation or the production of renewable fuels. Another $750,000 was awarded to assess the creation and delivery of carbon credits to private sector markets.

EQIP also provides farmers with payments to adopt nutrient management practices that reduce nitrogen fertilizer use—and thus nitrous oxide emissions—and to adopt crop residue management practices that increase the organic content of soils and sequester carbon. Wetlands restored by the Wetlands Reserve Program also sequester substantial amounts of carbon. In addition, EQIP and CSP increase the adoption of conservation tillage and other practices that sequester carbon in cropland soils. CSP provides energy enhancement payments to producers who substitute their petroleum-based liquid fuels with ethanol or biodiesel fuels. In FY 2006, CSP obligated about $22 million to energy management enhancements.

USDA's Rural Development (RD) Mission Area is responsible for implementing several renewable-energy-related programs. The 2002 Farm Bill established the Renewable Energy Systems and Energy Efficiency Improvements Program. This program provides grants and loan guarantees to agricultural producers and rural small businesses to assist with purchasing renewable energy systems and make energy-efficient improvements. The purpose of the program is to help farmers, ranchers, and small rural businesses reduce energy costs and to support and stimulate rural economic development by helping agricultural producers and rural small businesses create new sources of income, create new jobs, and create new uses for agricultural products and wastes. Grants may not

exceed 25 percent of the eligible project costs and guaranteed loans may not exceed 50 percent of the eligible project costs.

Eligible project costs include:

- Post-application purchase and installation of equipment, except agricultural tillage equipment and vehicles;
- Post-application construction or project improvements, except residential;
- Energy audits or assessments;
- Permit fees;
- Professional service fees, except for application preparation;
- Feasibility studies;
- Business plans;
- Retrofitting; and
- Construction of a new facility only when the facility is used for the same purpose, is approximately the same size, and based on the energy audit will provide more energy savings than improving an existing facility, with costs limited to those identified in the energy audit.

During the first 3 years of the program, USDA awarded a total of 435 grants totaling $66.8 million to agricultural producers and rural businesses in 36 States. These funds leveraged an additional $850 million in private sector funds. In addition, the first two loan guarantees were awarded at the end of FY 2005 for $10.1 million. In FY 2005, grants were awarded to recipients in 32 States.

The Value Added Producer Grants Program (VAPG) was initially authorized by the Agriculture Risk Protection Act of 2000 and extended through FY 2007 by the 2002 Farm Bill. Under the VAPG, grants may be provided for planning activities and working capital for marketing value-added agricultural products and for farm-based renewable energy. Grants may be used to develop business plans and strategies for creating marketing opportunities. Grants may also be used for feasibility studies and to provide capital to establish alliances or business ventures that allow producers of value-added agricultural products to better compete in domestic and international markets. Priority in the program is given to applicants who have at least 51 percent of project costs dedicated to activities for a bioenergy project.

Funding available for the VAPG totaled $32.78 million in FY 2006. Since the start of the program $20.5 million was allocated to projects to develop and market over 100 renewable energy projects in 29 States. This funding leveraged over $200 million in private sector resources. Renewable energy projects include biodiesel, ethanol or wind energy production, or the use of biomass to generate energy.

Projects to convert biomass into biobased products and produce bioenergy are eligible for financing under the Business and Industry (B&I) Guaranteed Loan Program. The overall purpose of the B&I Guaranteed Loan Program is to help create jobs and stimulate rural economies by providing financial backing for rural businesses. Providing financial support for projects related to biobased products and bioenergy production is viewed as a way to create new market opportunities for farm and forestry resources.

During FY 2001-05, the B&I Guaranteed Loan Program supported 10 biomass projects of which 7 were for ethanol production facilities. Another four ethanol projects were funded under USDA's Rural Economic Development Loan Program and a biodiesel project was supported under the Energy Guaranteed Loan Program. In addition, several more biomass projects were supported by direct grants.

The Biomass Research and Development Program is operated jointly by USDA and DOE. This program supports research and development of biomass-based products, bioenergy, biofuels, and related processes. Eligible entities are institutions of higher learning, national laboratories, Federal or State research agencies, private sector entities, and nonprofit organizations. FY 2006 funding for the Biomass Research and Development Program is $12 million.

Several other RD programs can be used to fund and support energy-related projects, although they are not directed specifically to that goal. For example, funding in several re-lending programs may ultimately be used to fund energy-related projects as part of a general business or community development effort. Utility programs, particularly for electric utilities, comprise a substantial part of the RD programs. Such programs directly or indirectly advance the development of energy conservation and distribution.

USDA's Agricultural Research Service (ARS) is USDA's primary research agency. Specific energy-related work being conducted by ARS follows:

- ***Better understanding of ethanol-producing bacteria.*** The process of cellulose degradation is not well understood. This research provides new information on the regulation of cellulose degradation by an organism that shows particular promise for converting cellulosic biomass.
- ***Improved organisms for ethanol production.*** Inhibitors formed during pretreatment of lignocellulosic material reduce the performance of ethanol-producing fermentation organisms. ARS scientists are using a method called directed adaptation, developing strains of organisms that have enhanced ability to convert toxic compounds into less toxic compounds. Development of these more tolerant organisms is a significant step toward achieving the technology necessary for commercial production of ethanol from cellulosic plant material.
- ***Key gene in cell wall biosynthesis identified.*** There is a need to identify genes that regulate cell wall composition of alfalfa so that new varieties can be developed that have greater potential as biofuel feedstocks. ARS scientists identified and characterized a gene, UDP-sugar pyrophosphorylase (USP), which plays an important role in cell wall biosynthesis in plants. The isolation of the USP gene and new knowledge learned about the protein it produces will allow cell walls of alfalfa plants to be modified to improve the value of this crop as a bioenergy feedstock.

USDA's Cooperative State Research, Education, and Extension Service (CSREES) leverages the nationwide expertise housed at land-grant universities. CSREES provides funding for about 60 projects that include an energy-related objective. The goals of these projects include:

- Reducing costs associated with the conversion of biomass to energy and industrial products,
- Increasing biobased product inventories to replace petroleum-based products,
- Developing technologies for effectively converting agricultural (including forestry) residuals into energy and products,
- Developing cost-effective biocatalysts capable of converting lignocellulosic materials economically, effectively, and with low environmental impact, and
- Identifying unique biomass feedstocks for the sustainable production of bioenergy and industrial products.

USDA's Farm Service Agency (FSA) administers the Conservation Reserve Program (CRP) and the CCC Bioenergy Program. The CRP was established by the Food Security Act of 1985 to assist owners and operators in conserving and improving soil, water, and wildlife resources on their farms and ranches by converting highly erodible and other environmentally sensitive cropland and marginal pasture to long-term resource-conserving covers. Participants enroll cropland in the CRP for 10 to 15 years in exchange for annual rental payments and cost-share assistance for installing certain conservation practices. Enrollment of up to 39.2 million acres is authorized, and there are currently about 36 million acres under contract.

CRP lands sequester significant amounts of carbon dioxide in soils and vegetative cover and many CRP lands have the potential to be used for the production of bioenergy crops, such as switchgrass, willows, and poplars. A 2003 analysis, for example, estimated that 13 million acres of cropland enrolled in the CRP could produce an average of about 4 tons of biomass per acre (dry matter) or over 50 million tons of biomass annually. The 2002 Farm Bill specifies the conditions under which CRP enrolled acreage can be utilized for biomass production. First, harvesting must be consistent with conservation of soil, water quality, and wildlife habitat, and second, payments must be reduced commensurate with the economic value of the biomass produced.

Under CRP's Biomass Pilot Program established in 2000, USDA approved the use of CRP land in four projects located in four States. The programs approved include one each in Minnesota (hybrid poplars), New York (willows), Iowa (switchgrass), and Pennsylvania (switchgrass). Projects were also approved in Oklahoma and Illinois.

The CCC Bioenergy Program began on December 1, 2000, and ended on June 30, 2006. Under the program, cash payments were made to bioenergy producers who increase their annual bioenergy production from eligible agricultural commodities. Eligible commodities included barley, corn, grain sorghum, oats, rice, wheat, soybeans,

other oilseeds, cellulosic crops, and animal fats and oils. From December 2000 through March 2006, the program reimbursed bioenergy producers $537 million for 2.5 billion gallons of increased ethanol production, 146.4 million gallons of increased biodiesel production, and 26.7 million gallons of base biodiesel production.

USDA's Office of Energy Policy and New Uses administers the Federal Biobased Preferred Products Procurement Program (FB4P), the USDA Certified Biobased Product Labeling Program, and the Biodiesel Education Program (BEP). All three programs were created by the 2002 Farm Bill.

Under the FB4P, Federal agencies will be required to give procurement preference to qualified biobased products if the products are available, meet performance standards, and are available at costs similar to their nonbiobased counterparts. Biobased products are defined as commercial or industrial products that are composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or renewable forestry materials. The first in a series of rules to designate items for preferred procurement was published as a final rule in March 2006. Six items were designated for preferred procurement by this rule: mobile equipment hydraulic fluids; biobased roof coatings; water tank coatings; diesel fuel additives; penetrating lubricants; and bedding, bed linens and towels. The 2002 Farm Bill also provides for a voluntary program authorizing producers of qualified biobased products to use a "USDA Certified Biobased Product" label and logo to identify qualified products.

The 2002 Farm Bill authorized funding of $1 million per year from FY 2003-07 for education grants under the BEP. Under BEP, two competitive grants were awarded to the National Biodiesel Board and the University of Idaho to educate the public, and government and private entities that operate vehicle fleets on the benefits of using biodiesel. Program funds have been used for organizing national conferences, conducting technical workshops, and distributing educational materials, including manuals on quality control. Many partnerships with other groups and government agencies have been formed to share information, leverage resources, coordinate activities, and avoid program redundancies.

USDA's Forest Service (FS) also plays a major role in energy production and conservation. The FS is working to increase production of all energy sources in an environmentally sound manner, capitalizing on the potential of woody biomass as a renewable energy resource, and contributing to the improvement of infrastructure for transmitting energy across the country. Increasing domestic energy supply includes providing energy facility corridors; ensuring that lands are available for energy mineral development and production; developing renewable energy resources such as woody biomass, wind, solar power, and geothermal energy; and re-licensing hydropower facilities.

Nearly 50 percent of the Nation's geothermal energy production comes from Federal lands. There are currently 354 federal geothermal leases, 116 on national forest lands, covering nearly 360,000 acres. At present, there are 5 producing leases on national forest lands contributing to a 12 mega-watt plant and a 45 mega-watt power plant that, combined, have resulted in more than $12 million in royalties.

The FS actively participates in a governmentwide initiative aimed at promoting development and use of biobased products and bioenergy. Programs include research on enhancing opportunities to use forest biomass to produce energy and other value-added products; developing economical, environmentally acceptable woody cropping systems to produce energy and other value-added products; exploring new processes to convert wood into ethanol; and identifying ways to increase energy conservation through changes in manufacturing technologies, harvesting technologies, building construction practices, and designed landscapes.

The focus of the FS Biomass and Bioenergy efforts is woody materials that are not part of the commercial forest product material flows. Woody biomass includes forest vegetation treatment residuals (tree limbs, tops, needles, leaves and other woody parts) that are by-products of forest management and ecosystem restoration. Currently, these materials are underutilized, commercial value is low, and markets are small to nonexistent.

A recent joint USDA and DOE report, *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply*, commonly known as the "Billion Ton Report," projects that there are over 1.3 billion dry tons per year of biomass potential, enough to produce biofuels sufficient to meet

more than one-third of the Nation's current demand for transportation fuels by 2030. About one-quarter of that total, roughly 380 million dry tons of biomass, could be produced in a sustainable manner from residues from private, State, Tribal, and Federal forest lands and from forest wood wastes.

The Healthy Forest Restoration Act (HRRA) authorized the use of $5 million to help "…establish small-scale business enterprises to make use of biomass and small-diameter material." These funds were to be used to: (1) help reduce forest management costs on National Forest System lands by increasing the value of biomass and other forest products generated from hazardous fuel treatments; (2) create incentives and/or reduce business risk for increased use of biomass from or near national forest lands; and (3) institute projects that target and help remove economic and market barriers to using small-diameter trees and wood biomass.

The EPACT authorized up to $50 million for grants to improve the commercial value of forest biomass for electric energy, useful heat, transportation fuels, and other commercial purposes. In FY 2006, 88 applications were received, totaling almost $18 million in requests. Eighteen proposals were funded at a Federal cost of $4.2 million. These projects leveraged approximately $9 million in non-Federal funds.

IV Economic and Policy Issues for Renewable Energy and Energy Efficiency Programs

This section provides a general discussion of the support provided by current programs using several evaluation criteria: increase in production of renewable fuels and energy efficiency, program cost, effects on farms and rural areas, and implications for U.S. commitments under the World Trade Organization (WTO).

Effects on Renewable Energy Production and Energy Efficiency

Federal and State governments have helped create markets for renewable energy through tax incentives and mandates. Ethanol production has increased sharply since the late 1990s, to 4 billion gallons in 2005 up from 1.8 billion gallons in 2001. Biodiesel production has grown to over 90 million gallons in 2005, a nine-fold increase from 2001. The EPACT mandates that 7.5 billion gallons of renewable energy be used in motor vehicles by 2012, guaranteeing a future demand for the renewable fuels. In addition to Federal and State programs, high oil prices and the phase-out of MTBE have contributed to the growth in renewable fuels production since 2001. While modest in size compared with tax incentives, USDA programs have contributed to this growth.

RD grants, loans, and loan guarantee programs supported the planning and construction of new production facilities and energy conservation projects, creating jobs and additional wealth-enhancing opportunities in rural America. In total, 650 renewable energy and energy efficiency projects were funded between FY 2001-05 at a Federal cost of $356 million. In addition, matching grants and funding by the private sector supporting these projects totaled another $1.3 billion. Included in these programs are 132 ethanol and biodiesel, 130 wind, 20 solar, 4 geothermal, 2 hydrogen, and 11 hybrid projects; 92 anaerobic digesters and 7 landfill gas recovery systems; 168 energy efficiency projects; and other projects including solid fuel research.

In 2005, additional conservation practices applied with the assistance of USDA that improved energy efficiency on farms and ranches included:

- Residue management on 4.5 million acres,
- Irrigation water management on 1.2 million acres,
- Nutrient management on 4.1 million acres, and
- Pesticide management on 3.9 million acres.

There is a significant opportunity to realize immediate economic and environmental gains through energy conservation activities. Preliminary estimates of the potential national savings from implementing the following five conservation measures could be greater than $2 billion per year. The measures include:

- Doubling of no-till acreage (from 62 to 124 million acres), saving 217 million gallons of diesel fuel and $500 million each year;
- Switching from high- or medium-pressure systems to low-pressure systems, lowering electricity use, and saving $100 million in pumping irrigation water costs;

- Increasing diesel irrigation pump efficiency by 10 percent, reducing diesel consumption by almost 26 million gallons, and saving farmers and ranchers almost $60 million each year;
- Doubling manure-based nitrogen use to replace fertilizer produced from natural gas valued at $825 million and 100 billion cubic feet of natural gas annually; and
- Using precision agriculture on more acres to reduce application overlap on 250 million acres of cropland, saving up to $825 million in fertilizer and pesticide costs each year.

Program Costs

USDA has more than 300 program areas and leverages the resources of an extensive network of Federal, State, and local cooperators in serving the public. Biobased products, bioenergy, and other energy-related work span across the various activities of the Department. During FY 2001-05, USDA funds expended on biobased products, bioenergy, and other energy-related programs totaled $1.4 billion. USDA outlays in FY 2006 on biobased products, bioenergy, and other energy-related programs is estimated at $272 million (Appendix Table 1). In addition, Federal and State income tax credits and other tax incentives that promote the use of ethanol and biodiesel reduce tax collections by over $2 billion annually.

A primary issue for the future is the role the public sector should play in supporting or subsidizing markets and in conducting research. The primary argument against public sector involvement is that if an economic incentive exists for renewable energy, then economic forces should bring forth the appropriate resources, research, and development necessary to build the market infrastructure. In theory, this may be true, but there are often barriers to entry, for example, there are relatively few players in the petroleum industry that dominate the production and distribution systems. In addition, there are public benefits of renewable energy that do not have an explicit market value, such as environmental and energy security attributes. These positive externalities are often ignored in the marketplace, causing renewable energy to be undervalued, resulting in a lack of private investment. In cases where there is underinvestment in a desirable product from the public point of view, the Government will often step in and provide public investment for research and development.

Economic Impacts on Farms and Rural Areas

A USDA study conducted in 2000 estimated the economic effects on the farm economy from increasing annual ethanol production to 5 billion gallons by 2010. The increase in ethanol production was projected to increase the price of corn by $0.32 per bushel and annual net farm income by almost $3 billion in 2010. In addition, the increase in ethanol production lowered the U.S. trade deficit and higher corn prices resulted in lower farm program payments.

A 2001 USDA analysis of increasing biodiesel production found that an increase in biodiesel demand sufficient to increase soybean oil use by an average of 1.5 billion pounds per year, over a 10-year period, would increase the average soybean oil price by 22 percent. The average farm price for soybeans would increase by 3 percent. The study also showed a 0.7-percent increase in annual net farm income over the 10-year period.

Studies show that increasing ethanol and biodiesel production has a mixed effect on the livestock sector. Increased ethanol demand leads to higher prices for feed grains that initially may result in increased costs for some livestock producers. However, higher feed prices will be partially offset by increased supplies of distillers' dried grain (DDG), which is a coproduct of ethanol production. The response by the livestock sector to changes in feed prices depends on the relative importance of protein (primarily soybean meal) versus energy (primarily corn) and the size of the price changes associated with these feed components. Because protein is relatively more important in the feed ration for poultry, feed costs for broilers and turkeys decline due to lower protein prices. On the other hand, the feed costs for beef and dairy cattle, and hogs would increase because their feed rations depend more on the energy content of the feed. These cost changes lead to small price declines in broilers and turkeys and small price increases in other livestock products. Since these production and price adjustments are small, increases in biofuels production over the next couple of years are not expected to have a major effect on the livestock sector.

USDA's Economic Research Service (ERS) conducted a study in 2002 assessing the employment effects of implementing a renewable fuels standard (RFS) requiring about 4.5 billion gallons of renewable fuel by 2012 (USDA, ERS, 2002). The authors assumed that the RFS would be satisfied mostly by ethanol from corn and a small amount

of biodiesel from soybean oil. Model simulations were developed for two production scenarios that generated 12,600 to 31,400 new jobs. Since the EPACT created an RFS requiring 7.5 billion gallons by 2012, the employment effects could be greater.

Some have argued that increased renewable energy production from agriculture products diverts production away from food at a time when food supplies are needed to meet the needs of the rapidly growing world population. Up to this time, strong trend growth in agricultural productivity, chronic periods of excess production, and periodic low prices suggest that the U.S. farm production sector is not stressing its capability to produce a sufficient and affordable supply of food for its customers. However, it is apparent that if renewable fuels are to capture a significant share of the transportation fuels market, biomass feedstocks other than corn and soybean oil will have to be economically and technically feasible to convert to biofuels.

WTO Consistency

The Uruguay Round Agreement on Agriculture (URAA) of the WTO established criteria for classifying programs that provide benefits to agriculture by how much they distort production and trade. This classification is important because programs that are deemed to be minimally or non-trade-distorting (so-called green box) are not subject to annual limits on support, as are programs that are classified as trade-distorting (referred to as amber box).

Green Box criteria. To be classified as green box support, a program must meet two sets of criteria. The first are fundamental requirements that the program must be publicly funded, not involve transfers from consumers, and not have the effect of providing price support to producers. In addition to these fundamental requirements, a program has to meet specific policy criteria, which are contained in Annex 2 to the URAA (the green box). If a program does not meet both sets of criteria, it must be reported to the WTO as amber box (or possibly blue box, but that option is not considered here). The most relevant policy-specific criteria for bioenergy programs are:

- ***Paragraph 2: General services.*** This paragraph covers a wide range of government activities that provide services or benefits to agriculture or rural communities. Such support includes research; pest and disease control; training; extension and advisory services; inspection; marketing and promotion; and infrastructure. Support cannot involve direct payments to producers or processors; provide on-farm facilities or inputs, such as provision of irrigation water; or provide for preferential user charges.
- ***Paragraph 6: Decoupled income support.*** To be eligible for green box status, payments must be determined by clearly defined criteria such as income, landowner, factor use, or production level in a defined and fixed base period. Payments cannot be related to any production, prices, or factor of production after the base period. Finally, no production can be required to receive a payment.
- ***Paragraph 10: Structural adjustment provided through resource retirement programs.*** To be eligible for green box status, payments must be part of a well-defined government program that removes land or other resources from marketable agricultural production for a minimum of 3 years (permanently for livestock). Payments shall not require or specify an alternative use for the retired resources that involves the production of marketable agricultural products. Payments cannot relate to type or quantity of production, or to prices, applying to production using the land or any other resource remaining in production.
- ***Paragraph 12: Payments under environmental programs.*** To be eligible for green box status under this paragraph, payments must be part of a clearly defined government environmental or conservation program and must fulfill specific conditions under the program, including those related to production or inputs. In addition, payments must be limited to the extra costs or loss of income involved in complying with the program.

WTO member countries are obligated to notify, or report, programs under the various domestic support categories. The last U.S. notification of subsidies *specific to agriculture* was made in 2004 for the crop years 2000 and 2001. No programs under the 2002 Farm Bill have been reported. Current and future programs should strive for consistency between bioenergy programs and WTO green box criteria. Issues in achieving this consistency can be illustrated by examining current USDA programs.

The CCC Bioenergy Program has not been notified to the WTO. The program does not meet any policy-specific criteria in the green box, so it would not qualify for green box status. Paragraph 2 does not allow for direct payments to be made to processors, which is the payment mechanism for this program. While payments under the CCC Bioenergy Program go to bioenergy processors, commodity producers benefit to the extent commodity prices are enhanced by increased demand. Annex 3, paragraph 7 of the URAA states, "Measures directed at agricultural processors shall be included to the extent that such measures benefit the producers of basic agricultural commodities." This suggests that payments under the CCC Bioenergy Program could be viewed as an amber box subsidy to the commodity on which the bioenergy producer received a payment.

With the possible exception of the Renewable Energy Systems and Energy Efficiency Improvements Program, the programs authorized by the 2002 Farm Bill either meet the criteria of Paragraph 2 for general services (green box) or would not be classified as agricultural programs. For example, to the extent that the energy systems under the Renewable Energy Systems and Energy Efficiency Improvements program help meet environmental goals (cleaner water or air), the grants could be viewed as environmental payments. Because the grants are limited to 25 percent of the costs of a project, they would be consistent with Paragraph 12 of the green box. But to the extent the program provides an interest subsidy on farm production inputs, the loans and guarantees could be viewed as an amber box input subsidy.

The 2002 Farm Bill permits harvesting biomass from land enrolled in the CRP. With respect to this program, Paragraph 10 requires that enrolled land must be removed from marketable agricultural production for a minimum of 3 years to be considered a green box program. Whether biomass is considered marketable agricultural production has not been determined.

In addition to specific USDA initiatives, general incentives to encourage bioenergy use have existed for many years. These incentives were recently addressed in The American Jobs Creation Act of 2004 (Jobs Act), which replaced the ethanol excise tax exemption with new tax credits for blending ethanol or using ethanol directly. The Jobs Act also initiated new tax credits for biodiesel. These new tax provisions do not distinguish between domestic and imported bioenergy. Any subsidy that is contingent upon domestic use of a product would be a violation of WTO rules.

The U.S. has historically notified the (prior) excise tax exemption/tax credit provisions as a subsidy (income tax concession) to the WTO Committee on Subsidies and Countervailing Measures (SCM). In its most recent notification for *all subsidies* in October 2003 for FY 2002, the U.S. notified the annual tax revenue loss due to the tax provisions of $1.07 billion in FY 2002, and an annual revenue loss of $30 million from the (prior) small ethanol producer credit. No part of the subsidy has been notified as an agricultural subsidy because the benefit goes directly to the blender or producer of the ethanol. To receive the tax benefits, ethanol and biodiesel must be made from renewable sources, but these are not exclusively agricultural products, and the tax provisions do not specify any particular agricultural product(s) be used to produce the biofuel (with the exception of the additional incentive for agri-biodiesel).

EPACT established a renewable fuel standard (RFS) of 7.5 billion gallons by 2012. Production of renewable fuel is allowed from such traditional sources as corn and other crops or from plants, grasses, agricultural residues, and waste products. Imported and domestically produced biofuels can be used to meet the mandate. There is no known precedent in the WTO for notification of a *de facto* subsidy as a result of a mandated use or consumption requirement, and the mandate itself has not been questioned under the WTO rules.

V Alternative Approaches to Enhancing Renewable Energy and Energy Efficiency

Afforable energy is essential for the American economy. This section suggests two alternative approaches to expanding renewable energy production and energy conservation. One approach is to expand the use of direct government intervention to change market incentives. Direct market approaches include the use of taxes, subsidies, or mandates on energy market participants to change their behavior. The second approach is to expand the use of indirect government support, such as research and demonstration

projects, technology transfer activities, access to credit, outreach and education, and similar activities. These alternative approaches are not being advocated by USDA. Each approach has both advantages and disadvantages. They are offered for the purpose of generating discussion and ideas for the 2007 Farm Bill.

In a competitive market, market prices usually provide the best stimulus to meet consumer demand in the most cost-effective way. Oil selling for $75 per barrel in mid-2006 provides substantial incentives to develop fossil and renewable energy supplies and conserve energy. Even so, there is a strong economic rationale for increased government support for the development of domestic alternative energy supplies. The rationale is based on several benefits of increased use of renewable fuels that are not reflected in the market price of renewable fuels. By not accounting for these positive externalities, the market is "underpricing" renewables and thus limiting their production. The rationale for government support is to "monetize" the nonmarket benefits to augment the market incentives. Care must be taken to create incentives that are commensurate with expected external benefits, so as not to distort markets. Key benefits of renewable energy that are not reflected in price include:

- ***Environmental benefits.*** Renewable energy provides a range of environmental benefits compared with fossil energy, including reduced emissions of toxic chemicals and greenhouse gases.
- ***Energy security.*** As described in the first section of this paper, DOE projects the United States will become increasingly dependent on oil imports in future years. Under this dependency, the United States is vulnerable to terrorism directed at foreign oil production, foreign political actions that withhold oil from the world market, and competition for limited global oil supplies from rapidly advancing developing countries. Sudden reductions in oil available to the United States would disrupt the U.S. economy imposing costs on U.S. citizens. Others costs not reflected in the price of oil are the U.S. military and diplomatic costs of securing foreign oil supplies. A related cost of import dependency and the large import share of the United States is the "monopsony effect," or an increase in the global oil price and U.S. oil costs caused by an increase in U.S. oil imports. Reducing oil import dependency would reduce these various costs imposed on the United States.
- ***The balance and exercise of geopolitical power.*** As oil prices continue to set record highs, the resource value of oil-exporting nations increases. The rising oil prices have increased the resources and leverage for some oil countries to pursue anti-U.S. interests. Moreover, some oil-exporting nations have weak free enterprise and democratic foundations, and record-high oil revenues have been used as justification for nationalizing energy resources and other anti-free enterprise actions. Increasing the supply of alternative energy to the point that it materially reduces U.S. oil imports and global oil prices would reduce the leverage and opportunity of global bad actors to pursue anti-free enterprise and undemocratic actions.

One cautionary note associated with increased biofuels production is that without the adoption of appropriate conservation practices, there is a potential for unintended adverse environmental impacts. For example, corn production may expand into environmentally sensitive areas and the excess removal of biomass for cellulosic ethanol production may adversely affect soil quality.

Although the following alternatives address direct and indirect support of renewable energy production, USDA will continue to emphasize energy efficiency and conservation through existing natural resource conservation programs. Items of interest in the 2007 Farm Bill discussion include EQIP authorities for NRCS to cost-share on energy-related activities including energy audits.

Alternative 1: Expand Federal Direct Market Intervention To Support Renewable Energy

Many direct market incentives exist now. Some of these policy tools have been created in legislation that is unrelated to a farm bill or to the jurisdiction of the agriculture committees. It is unclear how expansive energy provisions could be in the 2007 Farm Bill. Thus, this alternative offers a range of ideas for public consideration, with the understanding that suggestions requiring legislation may not be the under the jurisdiction of the agriculture committees. Some of the ideas listed here are currently under public discussion, and all represent areas where USDA

might be expected to have a role in design or implementation. Thus, options that are unrelated to USDA are not considered (such as oil taxes or CAFE standards).

Possible expansions of direct market intervention include:

- ***Raise the level of the Renewable Fuel Standard (RFS).*** Because biofuel production currently exceeds the amount of renewable fuels required under the RFS, the standard is not expected to be binding and thus provides little incentive to produce additional biofuels. The RFS could be raised to provide a greater production incentive. The cellulosic requirement under the RFS could also be expanded and accelerated to begin before 2012.
- ***Extend renewable energy tax credits to 2015 or later.*** With credits expiring in 2008 and 2010, this change would reduce investment uncertainty created by the current expiration dates.
- ***Reduce biofuel tax credits when they are not effective in increasing biofuel supply or are not needed.*** This change would avoid excessive use of credits and save Federal budget resources by making credits variable. Reductions could be accomplished a number of ways: limiting eligibility for credits to biofuel production in excess of the RFS, because the credits are not needed to ensure production up to the RFS level; linking the size of the credit to the price of oil, for example, the higher the oil price, the lower the credit rate; or linking the credit to the cost of producing ethanol.
- ***Provide accelerated depreciation on renewable energy equipment and facility investment.*** This preferential tax treatment could help spur new investment in specialized production, handling, and processing equipment and facilities for biopower, biofuels, and bioproducts. The preference could be expansive or limited, for example, only for facilities using biomass for cellulosic conversion, and it could be temporary.
- ***Provide a depreciation allowance on certain land.*** Examples include lands on which high-voltage transmission, wind or solar generation, geothermal generation, landfill gas, and coal field methane development occurs. This allowance could be considered similar to the oil industry depletion allowance and would help increase the return on investment. The depreciation allowance should reflect any economic loss in the value of land due to degradation, which in the case of some uses may be minimal. Similarly, a depreciation or depletion allowance, or alternatively a conservation payment, could be considered for cropland used to produce biomass to help protect wildlife habitat and limit soil erosion.
- ***Use more land enrolled in the CRP for biomass harvesting and wind energy.*** CRP land was used for pilot programs in the late 1990s, when farmers were allowed to harvest biomass for energy use with a reduced rental rate. The 2002 Farm Bill allowed the Secretary to permit the managed harvesting of biomass and the installation of wind turbines, consistent with the conservation of soil, water, water quality, and wildlife habitat.
- ***Refocus the CCC Bioenergy Program.*** The CCC Bioenergy Program expires in 2006. With the RFS and tax credits, the program is no longer needed. However, the CCC Bioenergy program could be recast to support only cellulosic ethanol feedstocks, including dedicated energy crops or agricultural/forestry residues to be made into cellulosic ethanol. A larger program could support biomass used for bioproduct processing. Consideration could be given to simplifying the program to provide a payment rate per unit of output (such as per gallon), examining the issue of a payment limit per eligible entity, and terminating the program as cellulosic ethanol or bioproducts become commercially feasible.

Economic Impacts. The list of approaches under this alternative would have a range of impacts. Expanding the RFS beyond the levels in current legislation could increase biofuel production. That production would likely come initially from corn, resulting in increased prices for corn and higher farm income. However, depending on the size of the increase in the RFS, there would likely be increased risk of tighter commodity markets, especially if weather or unforeseen export demand caused sharp corn price increases as was the case in 1996. Any resulting price spikes could disrupt the livestock, poultry, and processed product industries. Feedstock shortages could be addressed with a

waiver of the RFS, but the use of a waiver may reduce confidence in the ethanol industry's ability to provide a reliable supply of biofuels.

Tax preferences, such as extended credits, accelerated depreciation, and related allowances, would increase the return on investment in renewable energy and thus increase its supply. A supply increase would be positive for energy security, rural development, and producers of renewable energy feedstocks. However, there are some concerns to consider. First, tax preferences reduce Federal revenues and increase the budget deficit. Second, using tax preferences to encourage production in a mandated market, such as the RFS, may have little effect on production and result in a transfer of income from taxpayers to biofuel consumers. Third, in an environment of $75-a-barrel oil, tax preferences are not currently needed to expand biofuel production. In light of these concerns, tax preferences should be structured to ensure that they generate new investment and are not excessive in relation to the price of oil and the cost of producing renewable energy. Making credits variable based on oil prices or biofuel costs could reduce taxpayer costs but would lessen investment incentives in renewable energy when oil prices are high and would likely be administratively complex.

Ethanol made from cellulosic feedstocks is viewed as potentially the most cost-effective way to provide large-scale ethanol production without creating commodity market shortages. Many groups have advocated specific targets for renewable fuels in the future. For example, in his 2006 State of the Union speech, President Bush stated the goal of replacing more than 75 percent of U.S. oil imports from the Middle East by 2025. His statement recognized that to achieve such a goal would require breakthroughs in technology that enabled ethanol to be produced not only form corn but from materials such as wood chips and switchgrass. Refocusing the CCC Bioenergy Program on cellulosic ethanol would avoid subsidies where they would have limited effect and provide financial assistance to an industry that is not yet commercial and has feedstock production, handling, transportation, and processing barriers to overcome to make it economically feasible.

WTO Consistency. The components of this alternative have mixed implications for U.S. WTO obligations. Provided the RFS does not discriminate against imported ethanol or biodiesel in favor of domestically produced biofuels, the RFS is not expected to be a WTO issue. The various tax preferences suggested would not be agricultural subsidies but would result in tax revenue changes that would be reported to the WTO as general subsidies (income tax concessions). A CRP payment made to a producer who is permitted to use CRP acreage for energy production could raise issues as to whether such a payment is a green box land retirement payment. However, if the CRP is viewed as an environmental program under WTO criteria, such a payment could be a green box payment, provided the CRP rental rate was reduced to reflect the value of the biomass and any remaining CRP payment on that acreage reflected compensation for the cost of environmental practices. The current CCC Bioenergy Program could be viewed as amber box, and a redefined CCC Bioenergy Program that made payments to biofuel or bioproduct processors for production specifically from biomass risks being viewed as amber box.

Alternative 2: Expand Federal Indirect Support for Renewable Energy

Indirect support for renewable energy would help overcome research and technology barriers, as well as problems with access to credit; increase public awareness; and allow other measures that do not involve direct taxes, subsidies, or mandates.

Possible expansions of indirect Federal support include:

- ***Expand agricultural support on the national research initiative for cellulosic ethanol.*** Some have suggested that the public benefits of large-scale, cost-effective cellulosic ethanol production are so great that a major research and development initiative between the government and private sector is warranted. This effort would substantially build on existing programs and the President's Advanced Energy Initiative. It could focus on biological and engineering research that promotes the development of economically viable raw materials, processing technologies, and products. The effort would involve Federal research facilities, competitive grants, public-private partnerships, and Federal-supported demonstration projects.
- ***Expand creative financial engineering to support development of the biobased economy.*** (See also the 2007 Farm Bill Theme Paper on Rural Development, Alternative 2.) Private sector firms engaged in

development of the bioeconomy indicate the need for public sector support beyond grants, loans, and loan guarantees, such as some form of equity funding that could be leveraged with their own equity and debt financing. This funding is important when starting the first generation of commercial-scale demonstration or production plants using a technology without a proven record of commercial operation, such as cellulosic ethanol plants and biorefineries. Until the technology is proven economically and technically viable on a commercial scale, equity financing may be difficult to obtain, and debt financing alone is insufficient to launch most projects. A first step to developing new financing approaches is to evaluate the existing government development assistance programs to improve their effectiveness and recommend new financial products that could fill financing gaps. One financing mechanism to consider is to enable and assist Farm Credit System institutions and commercial banks to create investment subsidiaries to invest in nonfarm rural businesses. Another idea is to provide insurance to start-up bioenergy or bioproduct enterprises for specified losses through their first production cycle. Yet another idea is to create a development program for new products and markets that provides data bases, forums for interaction between entrepreneurs and financing entities, and business start-up counseling.

- ***Fund development, demonstration, and pre-commercial activities that will bridge the gap between federally funded basic research and industry-funded applied research and development.*** This funding gap, the so-called "Valley of Death," often involves proving a concept at a sufficient scale to encourage full-scale production, which is necessary to attract private investment. One approach is public-private partnerships as exemplified by the Advanced Technology Program (ATP) of the National Institute of Standards and Technology. Another approach is to use Federal facilities (or develop joint public-private facilities) to establish the proof-of-concept. Such facilities would contain large-scale processing equipment and qualified personnel. Examples of existing public-sector facilities that could play such a role are the DOE Alternative Fuel User Facility in Golden, Colorado, and the USDA Laboratory for Agricultural Utilization Research in Peoria, Illinois.
- ***Expand education and outreach for the bioeconomy.*** Educating the public on the bioeconomy would facilitate the transition to greater use of biofuels and other bioproducts. There is still limited public understanding of the economic, environmental, sustainable development, and energy security value of biofuels and other biobased products. Issues and benefits need to be better defined in consumer terms. An outreach and education program that expands beyond the current Biodiesel Education Program, with clearly defined and measurable goals, could increase interest in renewable and biobased products and support new biomass products and applications. Integration into schools could help to stimulate support for future bioproducts as well as interest young people in careers in this area. The pool of trained people is limited in areas such as natural products chemistry and carbohydrate chemistry.
- ***Meet expected new demands for rural electric generation and transmission.*** Demand for new electric power generation capacity is building, after many years of little or no new base load capacity being added. Substantial increases in loan guarantee authority are expected to be necessary to assure the required debt capital. While USDA loan guarantees typically are for 95-100 percent of the loan, consideration may be given to develop a more traditional loan guarantee program for private lenders and use partial loan guarantees or create a mechanism for lenders to bid for the level of guarantee they would require to provide financing. Loan guarantees and planning grants could be targeted to support the development of distributed generation facilities using biobased fuel, wind, solar, or geothermal resources. Often the distribution grid must be augmented to accommodate renewable or distributed generation power. Loan guarantee authority to support projects to upgrade the grid would help build renewable energy capacity. High-voltage transmission capacity to move renewable energy from its source to demand locations is a serious constraint to renewable power development. Clarifying access rights and pricing for high-voltage transmission could also be helpful in facilitating needed transmission development.

Economic Impacts. The essence of this alternative—research and development, creative financing, and education—avoids direct distortion of market incentives. These actions would reduce the risks currently faced by potential investors in bioproduct technologies. Commercialization of cellulosic ethanol has not yet begun; capital costs and the conversion process costs for the initial facilities are high. Several apparently effective technologies have been developed for cellulosic ethanol and other bioproducts and appear only to require the sufficient investment capital to become commercialized. Once these industries become established, improved production efficiencies are expected to reduce product cost and, along with that, the need for continued government assistance.

While avoiding direct market intervention, these approaches still affect market outcomes by reducing production costs through efficiency gains and through credit subsidies. Because these approaches use Federal support for specific technologies and firms, there is a risk that the Government will support activities that in the long run are not cost effective. While having the Government pick "winners" risks dissipating taxpayer dollars, the Government can support a portfolio of technologies and firms to increase the probability of bringing an investment to economic success. On the down side, this approach would likely raise the costs of this alternative. All approaches require careful analysis of the role of public support versus private market incentives.

An expanded national research initiative to provide large volumes of cost-effective cellulosic ethanol would need to focus on a range of economic and technological barriers. The National Academy of Sciences (NAS) identified three priorities in biological research supporting a biobased industry: (1) the genetics of plants and bacteria that lead to an understanding of genes that control plant pathways and cellular processes, (2) the physiology and biochemistry of plants and microorganics directed toward improving bioconversion processes and modification of plant metabolism, and (3) protein engineering methods to allow the design of new biocatalysts and novel plant polymers. To maximize economic efficiency in designing the Federal initiative and the use of Federal labs, the Government should try to ensure that it does not support research that would otherwise be done by the private sector, and that development and use of any facilities for precommercial work should obtain a significant fraction of the needed funds from the private sector.

If efforts to commercialize cellulosic ethanol and other bioproducts succeed on a large scale, there is a potential for substantial changes in the farm economy. A recent joint USDA and DOE study implied that to generate a supply of biomass to achieve 30 percent replacement of U.S. petroleum consumption by 2030 would require shifting of production to biomass from current crops, cropland pasture, and the CRP. The effects of a large-scale bioproduct industry are not well understood and further economic analysis is needed to investigate the potential inter-commodity affects. For example, there would be implications for the supply, types, and prices of available animal feeds. Along with the engineering and science research on feedstocks and processing, more information is needed on land use and availability and on co-production systems, including the use and availability of new protein feeds from biobased products. There would also likely be widespread environmental effects. Production of agricultural and forest feedstocks can have positive, negative, or neutral consequences on wildlife, soil, air, and water quality. These results depend on many factors, such as previous use of land and crop management practices.

The suggestion that greater support should go to renewable electricity projects and grid improvements to accommodate renewable energy is based on the potential economic benefits of distributed electric power generation. Distributed generation can more easily be scaled to local demand, reducing the need for large-scale base load generation development. Distributed generation can also reduce the need for developing new high-voltage transmission lines.

WTO Consistency. Most of the ideas for discussion presented here would not be considered agricultural subsidies, although the research and development programs may be considered green box programs consistent with paragraph 2, General Services, under Annex 2 of the URAA. The various credit and financing suggestions (loans, loan guarantees, and equity investments) for rural businesses would not be payments for using specific agricultural products. These programs would not be viewed as agricultural subsidies but as general subsidies, similar to the current treatment of such programs.

VI Suggestions for Further Reading

The following is a list of selected USDA publications related to the issues raised in this paper.

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Perlack, R. D., L. L. Wright, A. F. Turhollow, R. L. Graham, B. J. Stokes and D. C. Erbach. April, 2005. Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply. Oak Ridge National Laboratory. DOE/GO-102005-2135. 59p. **http://www1.eere.energy.gov/biomass/pdfs/final_billionton_vision_report2.pdf**

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APPENDIX TABLE 1. USDA Outlays for Biobased Products/Bioenergy Programs

BIOBASED PRODUCTS/BIOENERGY DETAILS	2001 ACTUAL	2002 ACTUAL	2003 ACTUAL	2004 ACTUAL	2005 ACTUAL	2006 EST
	(1,000s OF DOLLARS)					
AGRICULTURAL RESEARCH SERVICE						
Biobased Products	$41,480	$46,236	$49,623	$51,294	$49,529	$49,879
Bioenergy	6,867	17,475	19,341	19,820	19,587	20,052
Federal Procurement of Biobased Products	506	506	536	591	608	627
Total ARS	**48,853**	**64,217**	**69,500**	**71,705**	**69,724**	**70,558**
COMMODITY CREDIT CORPORATION						
Bionenergy Incentive Payments	40,684	78,744	147,211	149,440	90,006	60,000
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE						
Biobased Products						
Formula Programs	4,012	4,047	3,349	3,152	3,192	3,202
National Research Initiative	4,003	2,654	4,985	4,600	6,601	6,601
Special Research Grants	4,217	5,484	3,732	3,607	3,740	3,731
Bioenergy						
Formula Programs	Above	Above	366	1,263	1,261	1,086
National Research Initiative	Above	Above	1,010	4,097	1,238	1,238
Special Grants	Above	Above	1,539	2,217	2,212	2,223
Total, CSREES	**12,428**	**12,185**	**14,981**	**18,936**	**18,244**	**18,081**
FOREST SERVICE						
Biobased Products Research	12,000	12,000	12,000	12,000	10,000	10,000
Bioenergy Research	450	450	450	444	2,450	2,450
Total, FS Research	**12,450**	**12,450**	**12,450**	**12,444**	**12,450**	**12,450**
NATURAL RESOURCES CONSERVATION SERVICE						
Conservation Operations	20	0	0	0	0	0
Forestry Incentives Program	6,311	6,811	0	0	0	0
RC&D Bioenergy Demonstration Projects	728	728	723	0	0	0
Biomass R&D						
(Section 9008, Farm Bill)	0	5,000	13,909	13,525	12,627	11,650
CCC Section 11 Administrative Costs						
Biomass R&D			200	351	350	350
Total, NRCS [1/]	**7,059**	**12,539**	**14,832**	**13,876**	**12,977**	**12,000**
OFFICE OF THE CHIEF ECONOMIST						
Biobased Products and Bioenergy	612	612	630	630	635	628
Preferred Procurement and Labeling						
Program for Biobased Products	0	0	0	0	1,540	1,525
Federal Procurement of Biobased Products						

BIOBASED PRODUCTS/BIOENERGY DETAILS	2001 ACTUAL	2002 ACTUAL	2003 ACTUAL	2004 ACTUAL	2005 ACTUAL	2006 EST
	(1,000s OF DOLLARS)					
(Section 9002, Farm Bill)	0	1,000	1,000	1,000	1,000	1,000
Biodiesel Fuel Education Program						
(Section 9004, Farm Bill)	0	0	1,000	1,000	1,000	1,000
Total, OCE	**612**	**1,612**	**2,630**	**2,630**	**4,175**	**4,153**
OFFICE OF PROCUREMENT AND PROPERTY MANAGEMENT						
Alternative Fuels and Preferred Products	65	67	69	69	78	78
Federal Procurement of Biobased Products	0	0	0	720	187	193
Total, OPPM	**65**	**67**	**69**	**789**	**265**	**271**
RURAL DEVELOPMENT						
RCAP/DOE Matching Grant	0	2,820	133	0	0	0
Value-Added Grants 2/	0	0	0	500	1,946	2,500
Renewable Energy Programs: 3/						
Grants	0	0	0	22,812	22,238	11,385
Loans	0	0	0	0	579	11,385
Renewable Energy Grants and Loans						
(Section 9006, Farm Bill)	0	0	21,707	0	0	0
Other RD grant programs	474	0	0	0	0	0
Other RD loan programs	1,550	0	0	0	0	0
Total, RD	**2,024**	**2,820**	**21,840**	**23,312**	**24,763**	**25,270**
TOTAL, USDA Biobased Products/Bioenergy	**124,175**	**184,634**	**283,513**	**293,132**	**232,604**	**202,783**
Other Energy-Related Programs	57,237	31,298	55,543	68,867	60,287	69,048
TOTAL Biobased Products, Bioenergy and Energy Programs	**181,412**	**215,932**	**339,056**	**361,999**	**292,891**	**271,831**

1/ In FY 2005, of the $14 million authorized to NRCS for the Biomass program, $540,525 was obligated for grants. The remaining was committed in FY 2005 and obligated in FY 2006.
2/ Only the portion of the program funding awarded for bioenergy is shown.
3/ Loans and grants are made to all renewable energy and energy efficiency projects.

Strengthening the Foundation for Future Prosperity in U.S. Agriculture

Introduction

This paper is the fifth and final in a series of briefing papers that assess general themes advanced at the 2007 Farm Bill Forums held during 2005 by Secretary Mike Johanns as well as related issues that have emerged in recent months. The first four papers focused on production agriculture and its links to risk management, conservation, rural development, and energy. This final paper provides an overview of the changing agricultural marketplace and the key forces that underlie the competitiveness of American farmers.

The first section provides an overview of the major trends in the food marketplace and the strategies that farmers have employed to remain competitive in this changing environment. The next three sections provide a discussion of issues related to international trade, the research and development that leads to new technologies, and the protection of agriculture from pests and diseases—three of the key driving forces shaping the agricultural marketplace. The final section of the paper discusses challenges and issues in preparing new farmers for this competitive marketplace, especially the next generation of farmers. Each section concludes with a discussion of some key issues and challenges for the 2007 Farm Bill debate.

The Changing Agricultural Marketplace

Farmers in the United States benefit from a rich natural resource base, a long history of investments in research and infrastructure, and a large consumer market for their products. They have long been considered among the world's most competitive. Rising exports from competitors and ongoing structural change across the entire food and agricultural system have raised questions about future prosperity in agriculture.

Markets and the Competitiveness of American Farmers

A farmer in the 21st century produces for an increasingly complex and competitive marketplace driven by today's varied consumer demands and supplied by highly competitive producers from around the globe. Consumers seek tasty food that is convenient, nutritious, and inexpensive. American farmers have responded to these opportunities through changes in the types of crops and animals produced, closer links with food manufacturers, and by adopting new technology and management practices to meet the market's cost and quality dictates.

Consumer-driven agriculture. American consumers have high expectations for the food they eat: variety, taste, nutrition, and safety represent just the basics. In addition, consumers increasingly purchase food for other attributes such as convenience or organic production practices. Against this backdrop of varied demands for food, price still matters. With low food prices and increasing affluence, American consumers spend on average only 10 percent of their disposable income on food, the lowest percentage in the world.

Consumers' high expectations for their food have driven change across the entire food system. Their varied preferences for price and quality support multiple business models in food retailing, manufacturing, and farming. One strategy is to develop tighter supply chains so that signals from consumers are directed quickly to farmers. For example, the pork industry has become highly integrated and delivers an ever evolving array of convenience products such as marinated tenderloins and ribs. Another strategy is to focus on niche markets, including providing environmental services. Producing crops for energy markets rep-

resents yet another opportunity for farmers. Farmers also engage increasingly in other farm-related businesses such as custom work and tourism.

Farmers respond to market opportunities. To remain competitive farmers have followed diverse paths that include changes in the crops and livestock produced, size of operation, types of business arrangements, and increased participation in off-farm jobs. The mix of crops and livestock has evolved in line with consumer demands as seen by the growing share of broilers in livestock receipts and similarly the growth in specialty crops in crop receipts (Figure 1). For the first time, revenues in 2006 from specialty crops are forecast to slightly exceed those from farm program crops (grains, oilseeds, cotton). Specialty crops include fruits and vegetables, but also the rapidly growing category of nursery products where farmers have taken advantage of the until recently booming housing market.

In the past 100 years, getting bigger has been a widely adopted strategy to remain competitive. Technological advances such as mechanization, hybrid seeds, and chemicals for weed and pest control have all permitted a single farmer to produce more. The pressures to increase the size of operations remain today because, on average, larger farms (as defined by sales) are more profitable (Figure 2). Economies of size enable these large commercial farms to

FIGURE 1. Distribution of Cash Receipts by Livestock and Crop, U.S., 1980 - 2006

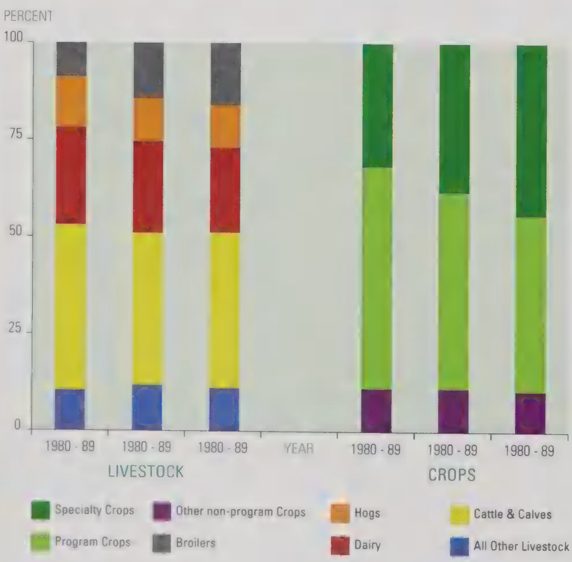


FIGURE 2. Farm Operating Profit Margin by Annual Sales Class, 2003

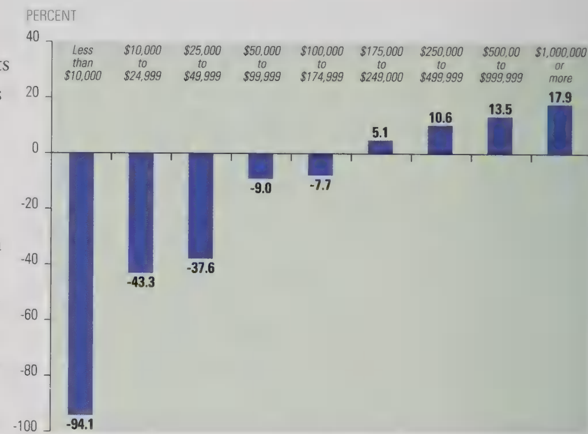
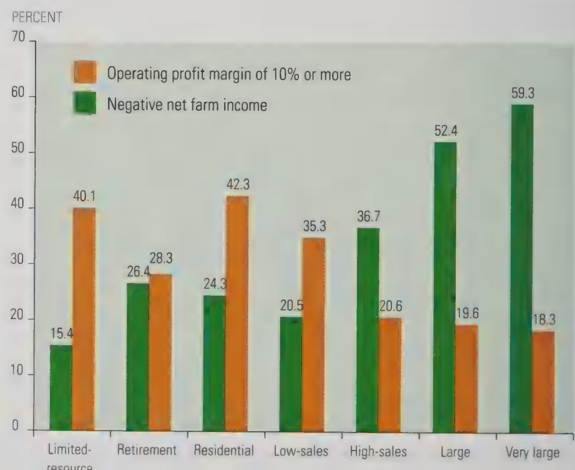


FIGURE 3. Selected Measures of Farm Financial Performance, 2003



have low unit costs. By contrast, most intermediate and rural-residence farms do not cover production costs from farm income.

While higher sales appear to explain farm profitability, the actual story is much more complex. As shown in Figure 3, the percent of both profitable farms and those that lose money is broken out into the groups defined by the Economic Research Service (ERS) Farm Typology. At all sizes—including the generally small rural residential farms where farming is a secondary occupation—some farms are profitable.

What explains the competitiveness of small- and medium-size farms against a long-term trend towards increasing size? The varied consumer marketplace provides one part of the answer where niche and local markets provide opportunities for small farms. In addition, a farmer's varied business strategies also explain the pattern of profitability.

Diversity of U.S. Agriculture

Farming today consists of enormously different farms growing numerous crop and livestock products for sale in markets that range from their immediate neighbors to consumers worldwide. Farms differ in size, type, and value of commodities produced, technology used, resource endowment, financial status, and other attributes. Farmers differ in time commitment, management abilities, business goals, and financial resources. Grouping farms into three types—commercial, intermediate, and rural residence—based on both their size of sales and primary occupation reveals key differences in terms of their numbers, shares of production, land holdings, and reliance on off-farm income (Figure 4).

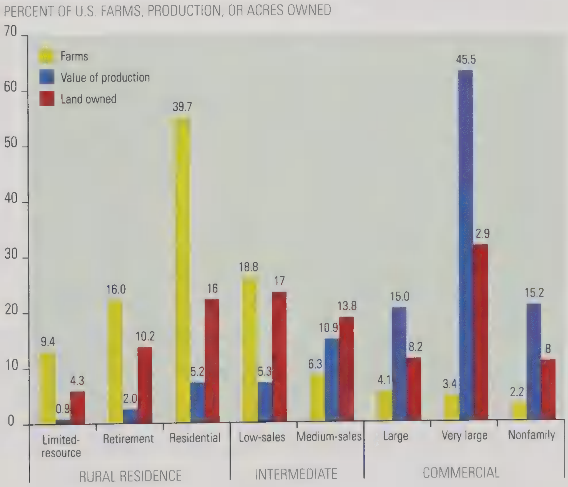
In 2004, there were 205,000 commercial farms. This group consists of large family farms with sales above $250,000 and nonfamily farms. This small proportion of farms, just under 10 percent of all farms, accounted for about 75 percent of total output. These farms have business goals that include containing costs and increasing sales and they are generally profitable. Despite their large share of farm production, they only own about 29 percent of farmland.

A second group of farms, nearly 1.4 million rural-residence farms, represent about two-thirds of all farms but only 8 percent of total output. They own nearly one-third of all farmland. These farm operators combine nonfarm jobs with farming. They include retired individuals and those who view farming as an investment and/or a way to enjoy rural amenities. For most of these farms there is little dependence on the farm economy for their income. Even though most of these farms are not profitable as stand-alone farm businesses, these rural-residence farm households typically have incomes comparable to or exceeding those of nonfarm households.

A third group of about 528,000 farmers consider farming their primary occupation and share goals with both commercial farms and rural-residence farms. These intermediate farms account for about 16 percent of total production and own about 31 percent of all farmland. Some emphasize economic and financial objectives much like the larger, more commercial farms and compete with their commercial competitors. Others have goals that align them more closely with smaller, less commercial operations. Those without substantial off-farm earnings often rely on alternative uses of agricultural resources to generate income. Many use farm equipment to provide custom work to other farms, some rent land to other farmers, and some provide hunting and other outdoor recreation as a way of generating additional income.

FIGURE 4. Distribution of Farms, Value of Production, and Land Owned, 2004

Small farms account for 24 percent of production, but for 90 percent of farms and 60 percent of land owned by farmers



Role of Off-farm Income

In 1970, only about 52 percent of farms had off-farm income. Today, virtually all farms report some off-farm income, as fewer farmers are full time with many choosing to merge both farm and nonfarm employment.

Off-farm income is increasingly important to the economic well-being of most farm operator households. In 2004, average farm operator household income for all farm operators was $81,500. While income from farming, as measured by net farm income averaged only $14,200, off-farm sources contributed on average $67,300 (Figure 5). As might be expected, the data show that the importance of off-farm income decreases as farm size increases.

Off-farm income is especially important for rural-residence farms, which on average regularly generate little or no income from the farm, with many actually reporting negative net farm incomes. Not surprisingly, most rural-residence farms subsidize their farming activities as part of a rural lifestyle. Off-farm income is also critical for many intermediate farms, especially for those with sales under $100,000 (low sales), but contributes only a small share of total income to commercial farm households. On many larger commercial farms, family members work off-farm. Even on very large farms, income from off-farm sources in 2004 averaged $47,400. The widespread importance of off-farm income and related benefits, such as health insurance, illustrates that for the majority of farm households, the economic state of the general economy may be more important to their economic well-being than the level of commodity prices or the overall conditions in the farm economy.

Farm Management Strategies and Business Arrangements

Farmers use a variety of business arrangements to link themselves to other firms and individuals. These links vary by farm type and include arrangements to access the control of productive resources and to market the commodities they produce.

The key to agricultural production is the control of land and other assets. This control can be accomplished through renting or leasing rather than purchasing. Farms can also use hired labor, contract labor or custom work rather than family labor. Today, almost one-half of the acreage in production is rented. Three-fourths of all commercial family farms and intermediate farms with sales over $100,000 rent land as part of their farm production strategy.

FIGURE 5. Mean Farm, Off-Farm, and Total Operator Household Income, 2004

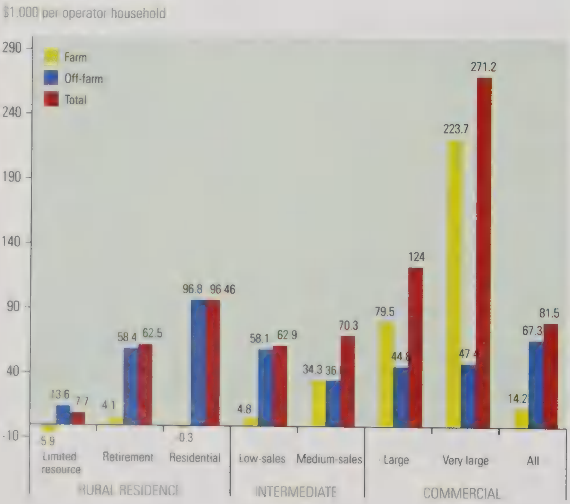
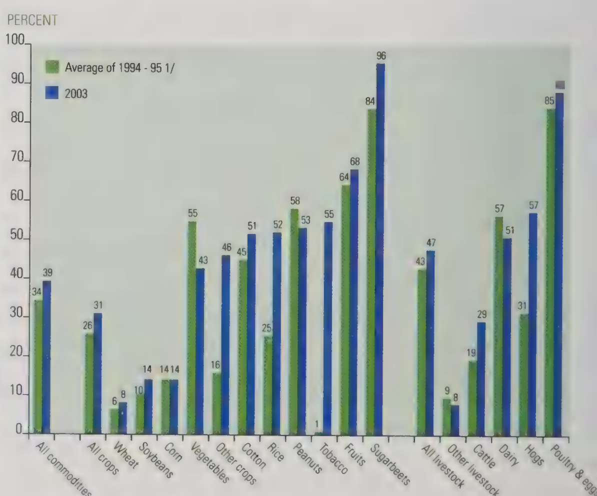


FIGURE 6. Production Under Marketing or Production Contracts for Selected Commodities



*Standard error is between 25 percent and 50 percent of the estimate
1/ An average of 1994 and 1995 was used to provide a more statistically reliable estimate

A growing management strategy is the use of marketing or production contracts which are used by all sizes of farms, although more extensively by large farms. Farmer use of contracts depends partly on the type of product produced (Figure 6). Contracting remains at a relatively low rate for grains, which remains a bulk commodity business. In contrast, contracting is the dominant marketing method for horticultural products and has grown for hogs at the same time integration has increased across the marketing chain.

Issues and Challenges for the 2007 Farm Bill

The complexity and diversity of the farm sector suggests a wide divergence in the realities of farming across the country. The issues, concerns, and opportunities of larger, commercially oriented farms differ substantially from those of smaller rural-residence and most intermediate farms, regardless of location. Moreover, the challenges of commercial farms in one region may be vastly different from those in another. Farms in the Corn Belt, for example, may be most concerned about eroding competitiveness from rising land prices and rental rates and gaining greater access to global grain markets. Increasing competition for farmland—both from neighbors looking to expand and from relocating farmers that are looking to reinvest proceeds from the sale of higher valued land near urban areas—has contributed to significant increases in farmland values. Rising rental rates are also a concern as these farmers increasingly look to rent land as a means to farm additional acreage and spread fixed costs over a larger scale of operation.

In contrast, the more diversified farms in the western and southern coastal areas that primarily produce fruit, vegetable, nursery, and other high-value crops may be most concerned about increasing competition from imports and the cost and availability of farm labor. These labor-intensive farms hire a majority of the farm workers and accounted for over half of the $20.6 billion in farm labor expenses for all farms in 2004. These farmers, along with many farm-related industries, have increasingly relied upon foreign-born workers, especially for entry-level jobs. The outcome of the ongoing immigration reform debate could have significant implications for the cost and availability of farm labor that will affect the ability of farm operators to maintain or expand planted acreage of these labor-intensive crops.

Farmers of all types are faced with multiple sources of risk. Traditionally, farmers have proven resilient to a host of natural and market challenges, including weather-caused production losses, diseases and pests, and variable prices. The "Risk Management" paper characterized these risks. Some of these risks can be addressed through innovative management strategies and research and development (R&D). For example, R&D can lead to new varieties that are resistant to diseases or innovative biological control methods for pests. This type of R&D is important as the U.S. agricultural sector faces increasing pressures from plant and animal pest introductions, many of which pose significant economic, environmental, and societal threats.

III The Role and Contribution of International Trade

Major changes in the world's population and economy in coming decades will offer the prospect for greatly expanded agricultural trade. More people, with greater disposable income, will get their food and fiber from a constantly changing global production, processing, and marketing system. For many nations, the best way to meet increasing demand for agricultural products will be through trade, because agricultural resources are not always located in the same areas where populations and food markets are the largest or growing the most rapidly.

The world's population is projected to increase from 6.3 billion in 2003 to 7.5 billion in 2020, or by 1.2 billion people. More than 95 percent of this increase will be in developing countries. Consumer incomes also will grow in the next two decades. Incomes in developing countries are projected to grow at twice the rate of wealthier countries. Stronger income growth will raise the amount that households in many poorer countries spend on food. Food consumption in developed countries will also continue to change as consumers shift the composition of their food spending to realize greater dietary variety, health benefits, and convenience.

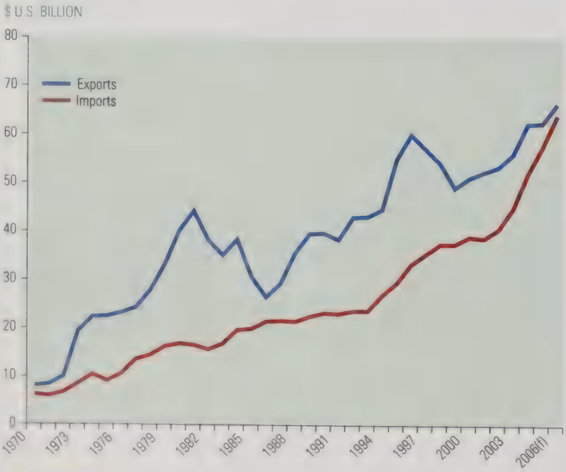
Supplying food requires more than just agricultural production. Transportation is essential for farm goods to reach markets and consumers. A sound legal system, finance for commodity transactions, food quality and safety, and a physical infrastructure for processing, packaging, and storing are all parts of the supply chain that brings food to consumers.

USDA recently projected that, assuming countries' agricultural policies remain as they were in 2005, population and income changes over just the next 10 years would lead to increases of 15 to 20 percent in the global import volume of coarse grains, wheat, and almost 40 percent for soybeans. Global increases in imports of meats will also be robust, ranging from almost 20 percent for beef to almost 40 percent for pork. This increased trade will be very important to the livelihoods of farmers in exporting countries, including the United States.

The Role of Agricultural Trade in the U.S. Farm Economy

International trade is a key part of the U.S. agricultural and food economy. U.S. consumers are only a small part of the world's population, and expanding foreign demand has boosted U.S. food and agricultural exports from $7 billion in 1970 to a projected $68 billion in fiscal year (FY) 2006. At the same time, U.S. consumer demand for variety and year-round product availability has led to increased food imports, projected at $64.5 billion in FY 2006 (Figure 7).

FIGURE 7. **U.S. Agricultural Trade**



Exports are critical for U.S. agriculture. Over many decades, U.S. agriculture has shown an ability to increase output while reducing cost per output. Without any change in demand, this growth in productivity would cause prices to fall. For many agricultural products, the main opportunity for further growth in demand has been in export markets. Continued growth in output will require maintaining and increasing access to foreign markets.

Compared with the rest of the U.S. economy, the agricultural sector depends much more heavily on global markets. For example, on average, U.S. farmers export 49 percent of their wheat, 35 percent of their soybeans, and 15 percent of their poultry (Table 1). For many high-valued products, export dependency is even higher—over 70 percent for almonds, over 60 percent for sunflower oil, almost 40 percent for grapefruit, and over 40 percent for walnuts. The prices farmers receive and income they earn from these products would be sharply reduced if producers lost access to export markets.

MEASURING THE IMPORTANCE OF TRADE

There are several ways to measure the importance of trade to agriculture, none of which are perfect. A typical approach is to compare the value of exports to the value of agricultural production or to farm cash receipts, which use prices received by farmers. This figure is 23 percent for 2005. But a major shortcoming is that exports are valued at the point of export, which includes the value of farm-to-port transportation and other costs. It is also difficult to measure the value of processed products at the farm gate, which account for a large share of U.S. agricultural exports. Another factor affecting export share that is not captured in this measure is the increasing amount of corn, soybeans, and other feeds that are exported indirectly in the form of meat rather than directly as bulk commodities.

Agricultural exports also play an important role in the overall U.S. economy. In 2004, every dollar of direct export sales generated another $1.48 in supporting economic activity, creating jobs not only on farms, but also in processing, transportation, and supporting activities. Some 825,000 jobs were generated from agricultural exports in 2004—388,000 on farms and 437,000 in assembling, processing, and distributing products for export. These export-related jobs and other business-related gains benefited all regions and sectors of the U.S. economy.

Throughout much of the 1970s and 1980s, U.S. agricultural export growth was centered on bulk commodities to food- and feed-deficit markets such as Japan, South Korea, Taiwan, and the former Soviet Union. But global trade in consumer-oriented/high-value products also grew rapidly during that period, as consumers in high-income countries demanded more foreign food products. U.S. exports of high-value products—meats, fruits and vegetables, dairy products, and processed foods—expanded rapidly. Through the mid-1990s, these products accounted for an increasing share of growth in U.S. agricultural exports. However, since the mid-1990s, growth in both global and U.S. processed food trade has slowed, and bulk agricultural commodities still account for almost 40 percent of U.S. agricultural exports (Figure 8).

Despite being the world's largest single country agricultural exporter, and a leading exporter for many commodities and products, the U.S. market share of export value has slipped over the past two decades (Figure 9). This development reflects export growth of traditional suppliers such as Canada, Australia, Argentina, and New Zealand, as well as increasing competitiveness of newer actors, including Brazil, Thailand, and Vietnam. Regional

TABLE 1. U.S. Farm Exports

Share of U.S. Production Exported

Average over	Wheat	Cotton	Rice	Corn	Soybeans	Broilers	Beef	Pork
1961-69	53.8%	34.4%	51.0%	12.3%	37.9%	2.0%	0.2%	0.5%
1970-79	57.8%	44.1%	58.9%	24.6%	38.0%	2.3%	0.4%	1.5%
1980-89	58.9%	47.6%	52.5%	26.2%	38.8%	4.3%	1.8%	1.3%
1990-99	48.7%	39.8%	46.0%	20.8%	34.4%	13.1%	6.9%	4.2%
2000-05	49.2%	62.8%	49.7%	18.3%	35.3%	15.5%	7.0%	9.3%

Share of World Production

Average over	Wheat	Cotton	Rice	Corn	Soybeans	Broilers	Beef	Pork
1961-69	13.3%	23.9%	1.4%	44.4%	67.6%	28.5%	26.8%	18.1%
1970-79	13.4%	19.4%	1.4%	44.6%	67.5%	23.6%	24.8%	15.0%
1980-89	13.0%	16.4%	1.5%	41.4%	55.5%	22.2%	21.4%	11.6%
1990-99	11.4%	19.4%	1.5%	40.3%	46.8%	24.3%	20.5%	10.1%
2000-05	9.6%	19.9%	1.7%	40.8%	39.4%	22.8%	20.2%	9.3%

Share of World Exports

Average over	Wheat	Cotton	Rice	Corn	Soybeans	Broilers	Beef	Pork
1961-69	42.3%	24.7%	19.0%	52.4%	87.6%	16.4%	1.0%	6.3%
1970-79	43.2%	19.7%	21.5%	67.8%	87.8%	12.4%	1.2%	9.5%
1980-89	37.4%	20.4%	20.1%	67.4%	74.7%	16.5%	4.1%	4.2%
1990-99	30.1%	25.0%	13.8%	67.2%	62.8%	40.0%	11.6%	9.1%
2000-05	25.5%	37.9%	12.2%	63.1%	46.1%	30.9%	10.6%	13.9%

FIGURE 8. Composition of U.S. Exports

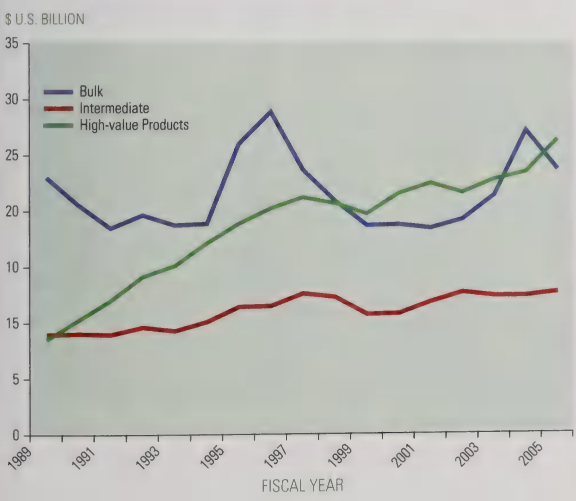
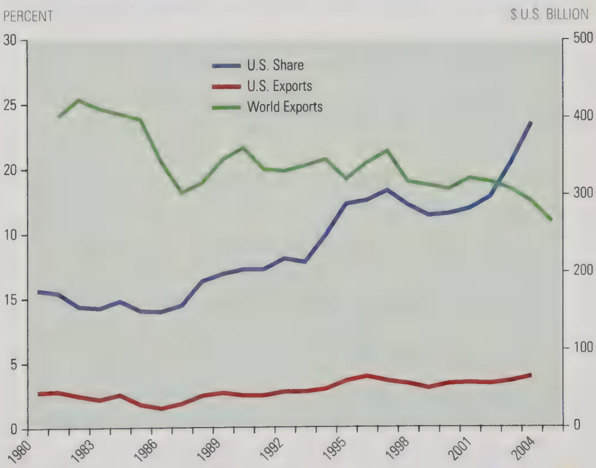


FIGURE 9. U.S. Share of World Exports



trading arrangements, such as EU enlargement, have encouraged regional trade growth and cut into U.S. export opportunities.

Agricultural imports also provide benefits. Imports of goods and services also benefit U.S. consumers and the economy. Despite its agricultural bounty, the United States is the world's second-largest importer of agricultural goods in value behind the EU. U.S. demand for food imports is driven by strong purchasing power, low import barriers, and tastes and preferences for food products not widely produced in the United States. About 11 percent of the value of U.S food consumption is imported.

Over the last 20 years, the mix of U.S. imports has broadened to include a wider range of fruits, vegetables, beer, wine, and livestock products in addition to tropical products, such as cocoa and bananas. More reliable supplies from foreign sources, improved shipping and storage technology, and wider ethnic diet preferences have contributed to these increases. Imports, together with domestic output, make fresh produce available year-round.

Given the fluctuation in exports and the rapid growth in imports, the agricultural trade balance has shrunk since 1996. Although the agricultural trade balance is a closely watched measure, it is not an indicator of competitiveness or import dependence. Trade is a means of providing for the needs and wants of consumers that are not satisfied domestically (such as bananas and coffee) or are produced more cheaply elsewhere (such as fresh cut flowers and pineapples). A lower U.S. agricultural trade surplus does not signal reduced competitiveness of the U.S. farm sector, but rather U.S. consumers' preference for a wide variety of foods and beverages. In the future, such factors as U.S. competitiveness, foreign economic growth, U.S. consumer demand, and exchange rates will determine the shape and size of the U.S. agricultural trade balance.

Role and Importance of Trade Agreements

The value and diversity of U.S. agricultural exports is tremendous, with major export flows of grains, oilseeds, meats, fruits, vegetables, fibers, and processed food products. On the import side, the large, wealthy, and diverse U.S. population buys large quantities of a wide range of products. U.S. exports and imports together give the United States a significant interest in agricultural products produced and traded around the world, and explain the long-held U.S. interest in the rules governing world trade. The United States has a big stake in fair, orderly, and open agricultural trade.

Current levels of trade, as well as future growth, depend not only on commercial considerations but also on the rules that countries follow. Over the past half century, the United States has worked with other countries to reduce barriers to trade in various ways. The most significant has been a series of multilateral negotiations, originally under the auspices of the General Agreement on Tariffs and Trade (GATT, 1947-94), and more recently under the GATT's successor, the World Trade Organization (WTO, 1995-present). The United States has also negotiated a number of regional and bilateral trade agreements. The most prominent of these is the North American Free Trade Agreement (NAFTA, 1994-present) with Canada and Mexico.

U.S. agriculture benefits from multilateral and regional trade agreements. Multilateral trade negotiations have improved the international trading system by lowering trade barriers, making the system more transparent, and establishing rules for dispute settlement. During the first seven rounds of GATT negotiations, however, the agricultural sector was exempted from many of the agreements that applied to industrial goods. The Uruguay Round (UR, 1986-94) represented a major shift by lowering agricultural tariffs and establishing disciplines on export subsidies and domestic support programs that distort agricultural trade.

The United States has also negotiated agreements for freer trade with regional and bilateral partners. While NAFTA is the most well-known, the United States has implemented free trade agreements with Israel, Chile, Jordan, Singapore, Australia, Morocco, and the Dominican Republic and five Central American countries (although Costa Rica has not yet implemented the agreement), and signed or completed agreements with Bahrain, Oman, Peru, and Colombia. Similar agreements are being pursued with Panama, Malaysia, South Korea, and other countries.

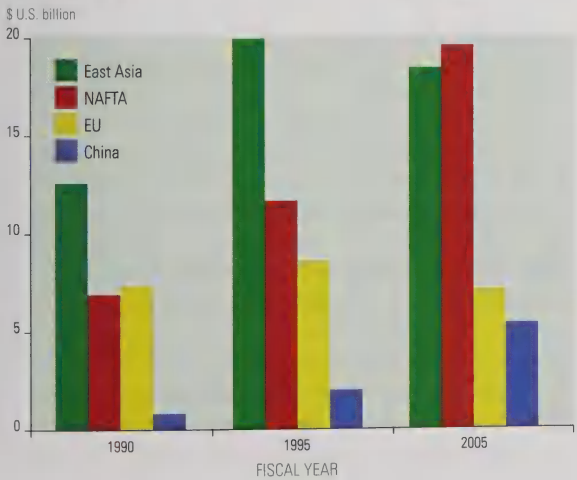
The importance to U.S. agricultural exports of trade agreements can be seen in changes in the destinations of exports over the last 30 years (Figure 10). In 1976, Europe was the destination for about one-third of U.S. agricultural exports; by 2005, Europe accounted for less than 11 per-

cent. Trade barriers and subsidies kept the EU market for many U.S. farm products from growing, and U.S. exports have declined. The share of Canada and Mexico rose from 8 percent in 1976 to 31 percent in 2005, partly because of lower trade barriers resulting from NAFTA. China has become a growing market, particularly following its accession to the WTO in 2001.

Barriers to agricultural trade. Despite the success of the UR, many barriers to U.S. agricultural exports remain. High tariffs add to the cost and decrease the competitiveness of many U.S. agricultural exports both to wealthier, industrialized countries and to developing countries. ERS has estimated average agricultural tariffs of WTO members at 62 percent, compared to a U.S. average of 12 percent. U.S. exports compete against subsidized production of farm commodities in certain countries, especially in the EU, Japan, and other developed countries. Some export competitors—notably the EU—still provide substantial export subsidies for key products.

Even though tariffs and other border measures have been reduced, foreign governments increasingly rely on sanitary and phytosanitary (SPS) measures and technical standards that do not have sound scientific justification, such as food safety regulations and plant and animal disease requirements, to block U.S. products.

FIGURE 10. **Destination of U.S. Agricultural Exports**



Benefits from trade reform. Economic analysis from many sources concludes that the costs of agricultural support and protection are high and that reform would bring substantial gains to both developed and developing countries (see suggested readings). An ERS study indicates that present levels of global agricultural tariffs and subsidies depress world agricultural prices by about 12 percent and lower the volume of world agricultural trade by 15 percent. Full elimination of global agricultural policy distortions would boost world welfare by $56 billion, or 0.2 percent of world GDP. Most of the market distortions are accounted for by tariffs (52 percent of the total), with additional welfare losses from domestic subsidies (31 percent) and export subsidies (13 percent).

The outlook for trade reform. The continuing importance of trade to the U.S. agricultural economy, and the barriers imposed by remaining restrictions and protection in global agricultural markets, has made the United States a strong proponent for continuing the multilateral reform process started by the UR. To this end, the United States was instrumental in kicking off the Doha Development Agenda in November 2001.

WTO members, under the auspices of the Doha Round, are seeking to improve upon the gains made under the three pillars of the UR—market access, export subsidies, and domestic support. Although reaching a final agreement remains elusive and negotiations were suspended in August, WTO members have preliminarily agreed to eliminate export subsidies by 2013, make substantial cuts in tariffs through a tiered process, and reduce and harmonize trade-distorting domestic support. In addition, members have agreed to reach new disciplines on food aid, government export credit programs, state-trading enterprises, tariff-quota administration, and other measures that continue to limit global trade.

USDA International Programs

USDA has a variety of international programs that support the expansion of U.S. agricultural exports, provide technical assistance to developing countries, and support international development objectives. The 2002 Farm Bill expanded funding for these programs and established several new programs. The programs are primarily administered by the Foreign Agricultural Service (FAS) and fall into five

broad categories: market development, export subsidies, commercial export financing, international development, and food aid.

Market development programs include:

- The Market Access Program assists cooperatives, small businesses, and non-profit trade organizations to finance promotional and marketing activities for U.S. agricultural products.
- The Foreign Market Development Program supports technical assistance, trade servicing, and market research activities that are designed to remove long-term impediments to U.S. exports.
- The Emerging Markets Program provides funding for technical assistance activities to address technical barriers to U.S. exports in emerging markets.
- The Quality Samples Program helps U.S. agricultural trade organizations provide samples of their agricultural products to provide a better understanding of their characteristics and quality to potential markets.
- The Technical Assistance for Specialty Crops program provides funding for projects that address phytosanitary and related technical barriers that restrict exports of U.S. specialty crops.

Export subsidy programs include the Dairy Export Incentive Program and the Export Enhancement Program (EEP). The EEP has not been active for many years and the DEIP has not been used for over 2 years.

Commercial export financing programs include the GSM-102 program and the Supplier Credit Guarantee Program (SCGP), which provide Federal Government guarantees of commercial lending for imports of U.S. agricultural products, at varying rates of coverage and tenor. The SCGP is not currently operational. The Facilities Guarantee Program (FGP) provides payment guarantees to finance commercial exports of U.S. manufactured goods and services that will be used to improve agriculture-related facilities in emerging markets where inadequate storage, processing, or handling capacity limit trade potential.

USDA international food aid programs include Public Law 480 Title I credit sales, the McGovern-Dole International Food for Education and Child Nutrition program, Section 416(b) donations, and Food for Progress grants. In addition, USDA has administered commodity procurement for the P.L. 480 Title II program, and manages the Bill Emerson Humanitarian Trust. In recent years, the programming focus has increasingly shifted to meeting emergency and humanitarian needs.

International development programs include a wide range of technical assistance, education and outreach programs for emerging markets and developing countries that are designed to support the development of science-based regulatory policies and promote food security. USDA international development programs are increasingly focused on trade capacity-building, or trade-related technical assistance, to support U.S. trade policy objectives by enhancing developing countries' ability to trade.

For many years the United States has had programs to assist firms and workers in adjusting to import competition. A new program aimed at farmers, Trade Adjustment Assistance (TAA) for Farmers, was established by the Trade Act of 2002 for FYs 2003 to 2007. Under the program, the USDA provides technical assistance and cash benefits to eligible farmers and fishermen if increased imports have contributed importantly to a price decline of at least 20 percent.

Issues and Challenges for the 2007 Farm Bill

International trade has been an important contributor to U.S. agriculture's prosperity. Food imports have provided consumers with low-cost, diverse, and nutritious products. U.S. trade policies have focused on removing barriers to U.S. exports, and USDA market development and export promotion programs have helped U.S. exporters compete in existing markets or tap into new ones. But as U.S. world export market share shrinks, the volume of bulk commodity exports stagnates, and exports are increasingly subject to unpredictable and often arbitrary SPS restrictions and other technical barriers to trade, a discussion about the future role of trade in the U.S. agricultural economy—and the appropriate programs and policies with respect to export promotion or import adjustment—is timely.

Competing effectively with more open trade. Many U.S. agricultural products will continue to rely on global markets, even as trade barriers and subsidies continue to characterize agricultural markets around the globe. The ability of U.S. agriculture to access foreign markets remains highly dependent on trade negotiations to remove these distortions, which is beyond the specific purview of USDA

policy. Substantial reductions in global tariffs and subsidies will provide opportunities for U.S. products to compete favorably in international markets, but only if products are of high quality and reasonable cost. USDA policies affecting risk management, research, technology, plant and animal diseases, and infrastructure will continue to play a major role in ensuring that U.S. products remain competitive in world markets.

Facilitating transition to greater global competition. Conversely, substantial reductions in U.S. tariffs and domestic subsidies could expose some U.S. products and sectors to greater global competition. Policy reforms may be needed to ease the transition, such as changing production-distorting farm payments to less distorting, decoupled forms, strengthening the economic infrastructure and vital services for the rural sector, and providing adjustment assistance to those who lose income. The Trade Adjustment Act (TAA) for Farmers, although not part of the 2002 Farm Act, will expire at the end of FY 2007. To date, the program has made small payments to agricultural producers, with most payments going to salmon and shrimp. A review of whether this program is meeting its objectives and providing effective import adjustment is timely.

Enhancing market orientation. Export subsidies, export credit guarantee programs, and food aid are subject to the current WTO disciplines and, depending on the outcome of the Doha Round negotiations, could be subject to new disciplines. WTO members have tentatively agreed to eliminate export subsidies. Since the EEP is not currently active, and the DEIP has not been used for over two years, eliminating export subsidies would not materially affect U.S. exports. The United States recently changed the GSM-102 program, has discontinued use of the GSM-103 program, and has legislative proposals before the Congress to authorize additional changes. The Administration has proposed no funding for FY 2007 for long-term, concessional sales under Title I of P.L. 480. All of these changes would enhance the market orientation of U.S. exports and are consistent with the objectives of trade reform in the Doha negotiations.

Supporting market and international development. USDA has five market development programs and a host of international development programs. A review of the effectiveness of these programs could be part of the 2007 Farm Bill process. Among other things, this review could consider whether the current structure and authorities for these programs provide sufficient resources and flexibility to address emerging issues related to trade competitiveness, particularly SPS measures and technical barriers to trade. Because most of the demand for food and agricultural products in the future will come from developing countries, increasing trade-capacity-building activities that strengthen developing countries' agricultural institutions and regulatory systems, encourage compliance with international norms, and foster adoption of modern approaches to agricultural policy and regulatory procedures could facilitate U.S. agricultural trade with these future markets. Given the critical role of agriculture in the economies of developing countries, the next farm bill process could consider the benefits of appropriations for international development activities, which are currently undertaken on a reimbursable basis at the request of outside agencies.

IV Enhancing Competitiveness and Efficiency

Title VII of the 2002 Farm Bill, Research and Related Matters, provides the impetus and financial basis for supporting public agricultural research and development (R&D). Funding for public research has been an important role of USDA for over a hundred years. Research performed and supported by USDA funding has played a fundamental role in enhancing agricultural productivity, increasing agricultural output, and expanding agricultural exports. Productivity and efficiency growth has made the United States a strong competitor in agricultural markets. This section looks at some of the benefits of R&D, highlights trends in agricultural research funding, addresses questions regarding future trends in agricultural research, and considers the direction of research.

The Role of Science and Technology (S&T) in Economic Growth

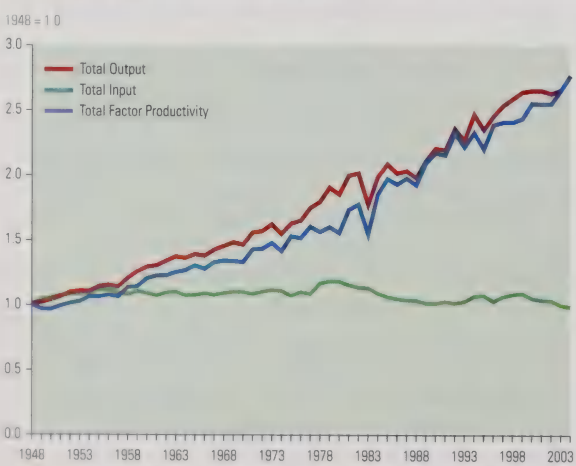
Historically, productivity growth has been one of the most important determinants of economic growth in the U.S. economy (Figure 11). Productivity measures the ability to achieve more output from a given bundle of inputs.

Technological advances that save scarce resources and enable producers to produce more output with fewer inputs has been a critical source of income growth, wealth creation, and international competitiveness. In U.S. agriculture, virtually all the growth in agricultural output over the last 50 years was derived by growth in agricultural productivity. Despite growth in agricultural output, the growth in the total amount of inputs used has been quite modest.

Technological change drives growth in agricultural output and results in new products and new processes or ways of doing things. Investments in science and technology (S&T) are what lead to these product and process enhancements. New fundamental knowledge about cell structure and DNA is what leads to advanced plant and animal breeding techniques producing higher yielding crops and leaner safe meat. Investments by USDA and the Land-Grant University system result in advances in fundamental knowledge. These kinds of investments require continued and sustained support because the pay-off is uncertain and is not observed, except in the long run. Public research institutions also undertake research efforts that benefit farmers and consumers in the near term. For example, new agricultural practices are developed by USDA- supported efforts that result in less soil erosion and better water quality.

USDA research efforts need to continue to be current and timely as well as forward looking. Public sector support for both long-term and near-term research efforts that work hand-in-hand work to increase agricultural productivity, improve the well-being of farmers and consumers, and enhance our international competitiveness. While a key role of publicly supported research is to undertake scientific discovery and the creation of new knowledge, public research also addresses key issues facing the public on a national, rather than a local or region basis. Homeland security, bioterrorism, and invasive species are prime examples where USDA-supported research addresses critical national information needs.

FIGURE 11. **Total Output, Input, and Productivity, 1948-2004**



Benefits of S&T Investments

Investments in science and technology have resulted in benefits to farmers and consumers alike. Farmers benefit from improved seed like hybrid corn varieties. Measures of the return on public investment in agricultural research

MEASURING THE BENEFITS OF AGRICULTURAL RESEARCH

Measuring agricultural research benefits involves solving a number of conceptual and empirical problems, as benefits may appear in different forms. Some research may tend to benefit society generally, and thus be harder to measure, such as the informational benefits associated with more basic research, the benefits resulting from the development of research tools, the benefits from more risky research, and the benefits from research with a longer time horizon. On the other hand, benefits that relate to a particular commodity, area, or need may be somewhat easier to define and measure. Direct benefits observable in a commodity market may also be easier to measure than indirect benefits such as environmental protection or increased food safety. Unlike many other areas of scientific research, some agricultural research is geoclimatically specific, and so benefits may at times be measured in a geographically disaggregated manner. And, as the discussion in the main text indicates, another important way of disaggregating the benefits of agricultural research is to do so among producers, consumers, and agricultural input firms.

have varied widely but are always very high, indicating additional investment is warranted. Conventional estimates of the return on investment in agricultural research have ranged from 35 to 70 percent. Returns reflect the benefits to producers and consumers of agricultural products. These benefits are shared widely—producers have benefited from things like higher yielding seed varieties, improved production technologies and cultivation practices, and resource-saving methods like drip irrigation and more efficient delivery of plant nutrients and pest control. Advances in livestock research and veterinary medicine have enabled livestock producers to produce higher yielding cattle, hogs, and poultry that are also leaner and grow more rapidly.

Consumers are also key beneficiaries of agricultural research. Food in the United States is abundant, safe, and affordable. All Americans benefit from advances in agricultural productivity through increased access to food. Given this abundance, what may be more important for consumers is research that seeks to maintain the safety of food within the supply chain and to provide information regarding food nutrition and food choice. But public research efforts have increasingly recognized the growing importance of addressing human health and nutrition issues. Obesity has become a chronic public health problem in the United States and the USDA is undertaking research to address this and other consumer issues.

Recent Trends in Science & Technology (S&T) Investments and Productivity Growth

Investments in public R&D, while continuing upward, have grown at a very slow rate. Preliminary estimates of both public and private inflation-adjusted investments in R&D suggest the private sector is spending considerably more on R&D than the public sector (Figure 12). The rapid growth in private sector investments has been attributed to changes in patent law permitting patenting of biological inventions, advances in biotechnology products, and a general growth in the agri-chemical and pharmaceutical companies. The recent down-turn in private investments is due in part to a retraction by the private sector from biotech investment strategies.

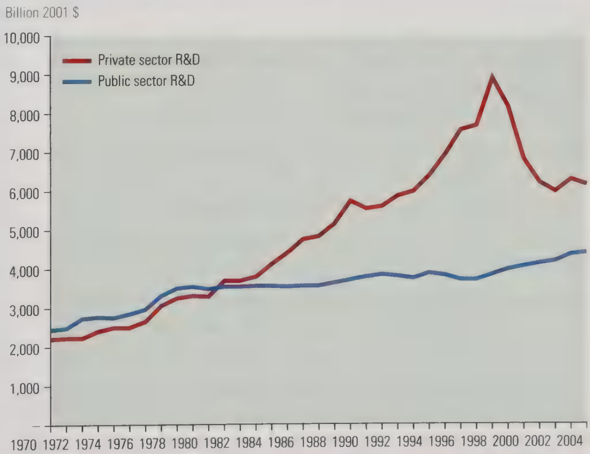
While it is clear that investments in S&T lead to an increase in productivity growth, output and competitiveness, the reverse is also true—reductions in investments can lead to a slowdown in productivity growth. The slowdown in the level of real S&T investments by the public sector during the early 1980s may have contributed to the eventual slowdown in productivity growth experienced during the late 1990s. Through the later part of the 1990s productivity barely grew at all. The decline in investment by the private sector since 2000 may also lead to future productivity declines. Productivity growth has been shown to occur long after investments are made because it takes time for research discoveries arising from the investments to work their way into the marketplace and become embodied in inputs that producers use. Investments by the private sector tend to be for "near-market" research, i.e., research that results in commercializable products not long after the investments are made. That is a fundamentally different type of research that relies ultimately on scientific discoveries often made in public sector labs.

Role of Publicly Funded Research

The Federal Government plays a unique and critical role in science. Disease eradication, resource conservation, and environmental protection are all results of national efforts from federally funded and performed research. The Federal Government has the unique capacity to identify national needs and coordinate research efforts to address these needs—both for short-term and long-term goals.

While the Federal Government is by far the single largest source of public agricultural research funding, not all of the advances in agricultural productivity are derived

FIGURE 12. **Public and Private Sector Investments in R&D**



from the public sector. As figure 12 suggests, private firms produce and market most agricultural inputs, from seeds to pesticides and farm machinery. Some of the underlying research into producing those inputs is undertaken by the private sector. The key difference between the public and private sectors regarding their roles in research is the marketability of the research. The private sector pursues research efforts in areas for which there is a market—the production of goods for which there is commercial value. The public sector, on the other hand, produces research that is valuable to society but which may not have direct or obvious commercial value or an existing market and therefore the private sector is unwilling to undertake it. The best example of this is basic or fundamental research—research on topics that expand human knowledge, or that solve fundamental problems in, for example, soil chemistry or plant pathology. This fundamental research may eventually be embodied in some new production input or technology. Other examples include research on means of protecting the environment and production practices that conserve natural resources. Because of the lack of markets for goods such as environmental quality, there is little incentive for the private sector to invest in R&D that will produce these non-market goods and services more efficiently. Also, this research can be too costly and long-term for industry to undertake without strong market-driven forces. Food safety and human nutrition are also areas where there is often insufficient incentive for the private sector to undertake this research.

Publicly Supported Data Collection

A necessary component of the research system, and important to decision-making, is the continual need for public sector provision of objective and consistent data. Data are critical to undertaking all kinds of research, and the lessons learned from data analysis inform decision-making and policy development. The data, information, and scientific collections that the public research system maintains and provides are critical for both researchers and policymakers. Freely available data and information is vital to all kinds of research whether bio-physical or socio-economic. Scientists throughout the world rely on the wealth of data and scientific information and materials maintained by USDA and other public science sources. This includes the resources available through the National Agricultural Library, USDA's systematics collections, and the National Germplasm System, as well as the socio-economic analyses and statistical data USDA makes publicly available to researchers.

USDA Research and USDA-Supported Research

The public agricultural research system in the United States comprises a Federal-State partnership. The Federal Government funds both intramural research through USDA agencies—the Agricultural Research Service (ARS), Forest Service (FS), and ERS—and extramural research at State institutions. The State institutions—the State Agricultural Experiment Stations (SAES) that are housed at Land-Grant Universities, 1890s Institutions, Forestry Schools, and Veterinary Colleges—are funded by a combination of Federal, State, and private sources.

This decentralized State-led structure has tended to result in successful, geographically specific applied research, but Federal research funding is intended at least in part to promote more basic research and interstate research spillovers. For this reason, the Federal Government maintains a strong intramural research program focused on research problems that are important nationally and that may receive too little attention from SAES. USDA also helps provide regional and interregional research coordination with the State-led system to avoid duplication of efforts and facilitate sharing of results.

In inflation-adjusted dollars, USDA research funding declined until about 1999, when total spending fell to about $1.4 billion (Figure 13). Since that time, inflation-adjusted spending increased to about $1.7 billion in 2004.

Funding of ARS programs, the largest USDA intramural research agency, has followed a similar pattern. Inflation-adjusted funding declined until about 1999, when spending began to increase from about $750 million to just over $900 million by 2002. Spending has been essentially level in real terms since then.

Extramural funding—funds administered by the Cooperative State Research, Education, and Extension Service (CSREES) for the Land-Grant and SAES system—also declined in real terms from the mid-1990s up to 2002 and increased after that. Funds awarded competitively through the National Research Initiative (NRI) also saw modest growth in 2003.

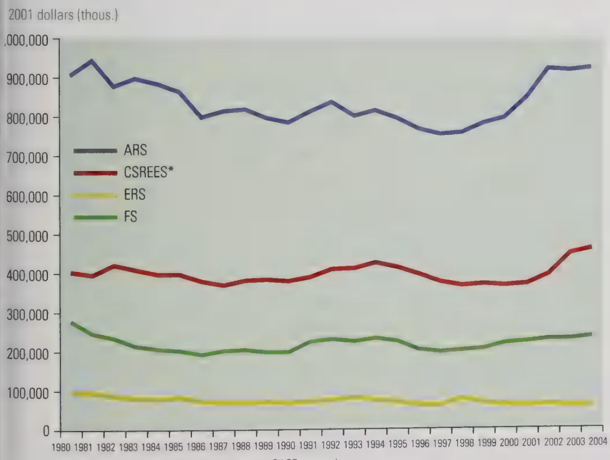
Public Agricultural Research as a Federal-State Partnership

Public funding of agricultural research (not adjusted for inflation) grew modestly in each of the last 25 years, but in real terms, funding remained basically level. Public research funding increased in real terms starting in the late 1990s, partly from increases in non-USDA Federal sources and industry funding to SAES that continued to increase. The SAES performs the majority of public agricultural research. Total real expenditures by the SAES have trended upward since 1980. Even with the recent increase in intramural spending in 2004, SAES invested more than twice as much in research ($2.9 billion vs. $1.2 billion) as did the Federal intramural agencies. While State appropriations are still the largest source of SAES expenditures, they have fallen in real terms by 10 percent since 2000 and are now lower than in 1980. Part of the explanation for this could be that a portion of the State appropriation is a match with Federal formula funds that are administered by CSREES. CSREES formula funds, the largest source of USDA support for the SAES, declined from $270 million in 1991 to $197 million by 2003 (2001 dollars).

Issues and Challenges for the 2007 Farm Bill

The key roles of public investments in Science & Technology (S&T) remain that of scientific discovery and problem solving for the benefit of society. The Federal Government has played a unique and critical role in S&T and will remain a key player. USDA plays a part in overall Federal research goals and priorities. Therefore, it is of critical importance that USDA research be coordinated with other Federal agencies in areas of shared responsibility, such as bioenergy. Within this relationship, the specific direction of research needs to be evaluated in light of the issues faced by producers and consumers now and in the future. Are we adequately anticipating and addressing the issues society will face in the future? Several issues emerge as especially important for prioritizing research to benefit agricultural producers and consumers in the near and distant future. Key priorities for consideration for 2007 Farm Bill funding include:

FIGURE 13. USDA Research Funding



*CSREES research funds are used to support SAES research.

Consumers, food safety, and biosecurity. Agriculture continues to be consumer driven. Consumers want safe, high-quality food. Biosecurity threats from plant and animal pests and diseases and invasive species, whether intentionally or accidentally introduced, heighten our awareness of a new kind of food safety concern and challenge our research to ensure these threats are countered with good science. Important efforts are underway in this area but continued and enhanced efforts are needed as well as an ability to respond quickly to rapidly changing concerns.

Bioenergy and biobased products from agriculture. Agriculture is both a consumer and producer of energy. Our national energy security requires that we look for alternative and sustainable sources of energy. Agriculture has the potential to be an important source of bioenergy. In addition, there is potential to use agricultural materials that may currently be wasted or not used effectively in order to develop new products. More research is needed to explore and develop these biological possibilities as well as to understand the nature of the markets, both domestic and international, for energy sources.

Genomics and informatics. The tremendous growth in information technology during the last 15 years or so has created an explosion of S&T possibilities. Mapping genomes provides enormous potential for enhancing crop and livestock production and creating safer and more nutritious food. The growth in informatics enhances the potential to take advantage of research in genomics.

Agriculture and the environment. Agriculture's relation to the environment continues to be an important area for research. For instance, mitigating agriculture's impact on the environment through investments in agricultural S&T could reap social returns. Linking bio-physical and economic data from farms will also greatly enhance our understanding of the effectiveness of conservation programs but it will give us better insight into why producers participate in conservation and other types of programs.

Human Nutrition. Improvements in the nutritional well-being of the population can lead to significant improvements in lifestyle and savings to the economy, both directly and through cost avoidance. Research can provide information on how to improve diets as well as how to encourage changes in consumption patterns.

Public research system. The advances in science and technology in U.S. agriculture are due in part to USDA and partnership with the Land-Grant Universities. This partnership provides the scientific foundation and knowledge base for improving our food, fiber, and energy foundation. Continued success of this research system requires that we should seek ways to improve the efficiency and effectiveness of our research programs, strengthen linkages, communication, and coordination among USDA and Land-Grant Universities, and enhance the quality of USDA conducted and supported science. It is therefore critical that Federal funding should emphasize high-quality research through peer-reviewed competitive awards that seek an appropriate balance between national priorities and regional and local needs.

V Protecting Agriculture

U.S. agriculture is complex, diverse, open, and affected by both local and global events, making it vulnerable to natural, unintentional, or intentional attacks from diseases, pests, and other agents that can result in significant production and economic consequences. Farm policy plays an essential role in strengthening and safeguarding America's agriculture and in doing so protects the health and well-being of domestic and global consumers. Policies designed to protect U.S. agriculture and markets work together with other policies aimed at reducing vulnerabilities and promoting the development of capabilities to detect and respond to agricultural threats, mitigate events, enhance response and recovery procedures, and apply the lessons learned from previous experiences with pest and disease threats and events both here and abroad.

U.S. agriculture faces two general types of threats: those limited to production effects (e.g., soybean rust) and those that affect consumer confidence and, potentially, human health (e.g., avian influenza). Concerns surrounding the impacts on human health are clear. However, the consequences of changes in consumer confidence on crop and livestock production due to events or mitigation efforts are spread along multiple paths, most of which are financial or economic in nature. Crop or livestock losses and related mitigation efforts can reduce competitiveness of parts or all U.S. agriculture by raising the cost of production or distribution. For example, in an effort to assess the possible economic impacts of soybean rust in the United States, ERS published a report on the economic implications of soybean rust in the United States. The study concluded that during the first year of soybean rust introduction, the expected value of the economic losses ranges from $640 million to $1.3 billion, depending on the geographic extent and severity of initial entry. As farmers adjust to the presence of soybean rust, annual expected economic losses range from $240 million to $2 billion, again, depending on the severity and extent of subsequent outbreaks.

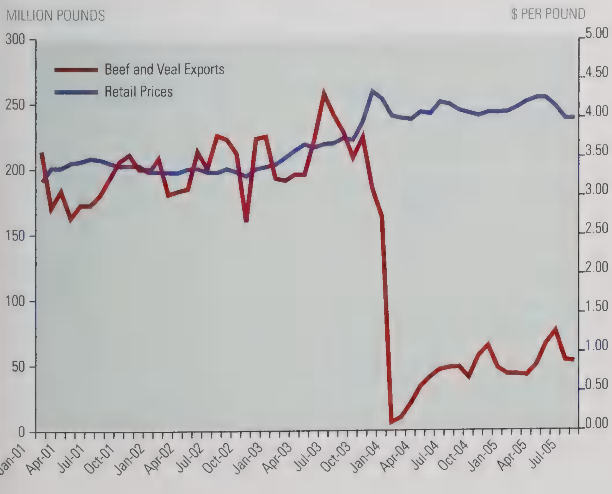
The effect on markets of pest or disease outbreaks would depend upon the proximity of the outbreak to major production areas and whether foreign country bans on trade were regionalized or covered the entire United States. For example, the most significant recent U.S. outbreak of high-path avian influenza (HPAI) occurred in 1983 and 1984 in Pennsylvania, Maryland, New Jersey, and Virginia. That outbreak affected mainly layer flocks and resulted in the depopulation of 17 million birds and loss of 1.2 million dozen eggs between November 1983 and August 1984. While the number of eggs and birds destroyed was small relative to annual U.S. production, the impacts of the loss of the breeder and laying flock were greater than implied by the destruction of the birds and eggs since they represent future production. In contrast, the 2004 outbreak of HPAI in Gonzales County, Texas, was quickly

found and eradicated, lasting only 5 weeks. This outbreak was confined to one flock of 6,600 birds that were depopulated and another 12,000 birds tested.

Even confined events, such as the U.S. experience with BSE, can cause dramatic reductions in international trade opportunities because of trading partners' phytosanitary regulations or related consumer concerns. For example, after the U.S. discovery of BSE in a Canadian-born cow in Washington State in December 2003, more than 50 countries suspended imports of U.S. ruminant and ruminant products. The discovery of BSE caused beef and veal exports to drop dramatically and retail prices to fall slightly but remain above earlier levels (Figure 14).

While the remedies for financial and economic consequences may be costly, they can be much less difficult to address than the consequences associated with a loss in consumer confidence. Consumers and producers are joint beneficiaries of activities in agricultural markets. The loss of trust in safety and integrity of agricultural markets leads to constraints and additional costs that are felt, if not borne, by both parties and the affected communities. Changes in consumer confidence can have a much larger and possibly more lasting impact on agricultural markets than supply shocks. As a result, critical policy issues include determining how information affects consumer confidence, who should supply the information, and under what conditions consumers are more apt to respond rationally and act based on actual risks given the uncertainty that so often initially surrounds events or disease outbreaks.

FIGURE 14. Effect of the December 2003 Finding of BSE on U.S. Beef Exports and Prices



USDA Efforts To Protect Agriculture

USDA plays a major role in protecting U.S. agriculture and consumers. Two key objectives of USDA's FY 2007 Budget Summary and Annual Performance Plan include: (1) reducing the incidence of foodborne illnesses related to meat, poultry, and egg products in the United States and (2) reducing the number and severity of agricultural pests and disease outbreaks. To advance these objectives, total USDA program-level funding is estimated to be $2.7 billion in FY 2006, with $1.2 billion directed toward reducing the incidence of foodborne illness and $1.5 billion directed toward reducing the number and severity of agricultural and pest and disease outbreaks. This section focuses on protecting agriculture from pest and disease outbreaks. To improve program planning, APHIS is developing performance measures that will demonstrate the impact of its pest and diseases programs on the economy, e.g., on losses due to plant and animal diseases.

While USDA has always endeavored to ensure a safe and plentiful food supply, events since the last farm bill have expanded the Department's mission to include addressing broader security concerns in concert with both public and private partners. USDA works with the Department of Homeland Security (DHS) and the Department of Health and Human Services' Food and Drug Administration (FDA) to ensure that Homeland Security Presidential Directives related to protecting U.S. agriculture are effectively implemented. In particular, USDA works through and closely with the White House Homeland Security Council and DHS on agriculture and food threat issues. The Department has developed dedicated mechanisms for addressing security and emergency response policy matters through the formation of its Homeland Security Council and the Food and Agriculture Government Coordinating Council that is jointly supported by DHS, USDA, and HHS/FDA, and State and local officials and reports to the Office of the Secretary.

Programs that contribute to the protection of agriculture appear throughout USDA mission areas. However, major responsibility for directly protecting agriculture lies with the programs of the Animal and Plant Health Inspection Service (APHIS). Total program-level fund-

ing for APHIS is estimated at $1 billion for FY 2006. APHIS carries out its mission to protect agriculture under provisions of the Plant Protection Act, the Animal Health Protection Act, and the Agricultural Bioterrorism Protection Act of 2002. APHIS is the key responder to plant and animal health emergencies and works with other Federal agency partners and foreign governments to exclude pests and diseases that could harm American agriculture. The agency maintains surveillance systems for early detection of animal and plant diseases, for example, avian influenza and soybean rust. APHIS also seeks to facilitate safe trade per the international Agreement on the Application of Sanitary and Phytosanitary Measures and works in international forums such as the Office International des Epizooties (OIE) and International Plant Protection Convention (IPPC) to develop protocols to protect animal and plant health. APHIS and cooperating partners have response plans and surveillance programs with the goal of quick detection, containment, and eradication of pests and diseases. Under the Agricultural Bioterrorism Protection Act of 2002, APHIS restricts access to pathogens capable of creating plant or animal diseases.

Research programs of ARS and CSREES also contribute to protection of agriculture by providing knowledge and technology to prevent or reduce damage to livestock, poultry, and plants. For example, ARS's livestock protection program produces knowledge and technology to reduce economic losses from infectious, genetic, and metabolic diseases of livestock and poultry and to eliminate the losses to animal production and products. This research also reduces the risk to humans of zoonotic diseases and enhances the safety of animal products. Program-level funding for the ARS livestock protection program is estimated at $71 million for FY 2006. ARS's crop protection program provides the knowledge to reduce losses caused by plant diseases by defining practices that are effective and affordable, and that maintain environmental quality. Research also provides the technology to manage pest populations below economic damage thresholds based on an increased understanding of the pest's biology and ecology. Program-level funding for the ARS crop protection program is estimated at $162 million for FY 2006.

The CSREES-supported programs include grants to support basic and applied research in areas of direct applicability to protecting agriculture. CSREES is creating a functional nationwide network of public agricultural institutions. The network is designed to quickly detect animal and plant diseases that are either deliberately or unintentionally introduced into our farmland, livestock, or natural ecosystems. This network will allow land-grant university diagnosticians and faculty, State regulatory personnel, and first detectors to communicate information, images, and methods of detection throughout the system in a timely and efficient manner. CSREES programs are helping to monitor and prevent disease outbreaks, avoid economic losses, and preserve consumer confidence.

The Food Safety and Inspection Service (FSIS) is the public health agency in USDA. FSIS protects consumers by ensuring meat, poultry, and egg products are safe, wholesome, and correctly labeled and packaged. FSIS programs protect the food supply and preserve consumer confidence by focusing on preventing food with microbial pathogens and other contaminants from entering commerce. Within FSIS, the Office of Food Defense and Emergency Response (OFDER) develops and coordinates all FSIS activities to prevent, prepare for, respond to, and recover from non-routine emergencies resulting from intentional and non-intentional contamination affecting meat, poultry, and egg products.

Protecting agriculture is also critical from a homeland security viewpoint. Homeland Security Presidential Directive-9 (HSPD-9) established a national policy to defend agriculture and the food system against terrorist attacks, major disasters, and other emergencies. APHIS and other USDA agencies share responsibility with other Federal agencies to develop awareness and early warning capabilities to recognize threats, to mitigate vulnerabilities, enhance screening procedures for domestic and imported products, and enhance response and recovery capability. Among the specific charges falling to USDA under HSPD-9 are development of a National Veterinary Stockpile of animal vaccine and development of a National Plant Disease Recovery System. HSPD-9 directs USDA to develop comprehensive and fully coordinated monitoring and surveillance systems to provide early warning of disease, pests, and poisonous agents by using information on animal, plant, and wildlife disease.

Under HSPD-9, USDA is also directed to develop a system to track individual plants and animals. The National Animal Identification System is currently being implemented on a voluntary basis through a cooperative State-Federal-industry partnership. This identification

system will enhance the speed and efficiency of disease tracebacks by standardizing animal movement recordkeeping and using newer technologies. Upon full NAIS implementation, the goal is to be able trace the movements of all exposed or infected animals entered in the NAIS within 48 hours of a disease diagnosis.

In addition to these new responsibilities under HSPD-9, the Secretary may declare an "extraordinary emergency" upon finding a new plant pest, noxious weed, bio-control agent, animal disease, or animal pest in the United States. This declaration triggers an increased degree of inspection of articles in inter- and intrastate commerce as well as Federal assistance programs targeted at livestock producers, growers, conservation activities, and assistance to rebuild agricultural infrastructure.

As part of its effort to protect agriculture, USDA has identified five objectives: intelligence and warning, border and transportation security, protecting critical infrastructure and key assets, defending against catastrophic threats, and emergency preparedness and response. The allocation of USDA spending across each of those objectives is presented in Table 2. Over half of USDA spending is directed toward intelligence and warning and border and transportation security for pest detection, animal health monitoring, and greater border inspection.

TABLE 2. USDA Homeland Security Initiative

ITEM	FISCAL YEAR				
	2003 Actual	2004 Actual	2005 Actual	2006 Estimate	2007 Budget
	Million dollars				
OBJECTIVE					
Intelligence and Warning	139	148	199	209	287
Border and Transportation Security	143	148	163	165	165
Protecting Critical Infrastructure 1/	168	37	151	93	46
Defending Against Catastrophic Threats	16	21	30	36	78
Emergency Preparedness and Response	48	57	57	60	75
Total, by Objective	**514**	**410**	**600**	**563**	**651**
AGENCY					
FSIS	9	13	19	23	39
ARS	166	31	151	94	81
CSREES	32	39	40	41	48
ERS	0	1	1	1	1
APHIS	289	303	368	381	453
Other	18	24	21	24	28
Total, by Agencies	**514**	**410**	**600**	**563**	**651**

1/ Variability is due to funding for the construction of the national animal disease research and diagnostic facility at Ames, which was fully funded as of FY 2006.

Lessons Learned

The lessons gained over many years of experience with animal and plant disease outbreaks (e.g., Avian Influenza, BSE, Exotic Newcastle Disease, Medfly, Soybean Rust, or Citrus Canker) both in the United States and abroad provide an excellent foundation for strengthening existing programs and designing programs to fill important gaps in our capacity to prevent or recover from disease outbreaks or other disruptive events.

Recent experiences also highlight the limits of government intervention and the need to foster the private sector's ability to adapt to new pressures while facing competing demands for resources. These experiences emphasize the need to continue to support research on detection methods and the development of better outbreak management strategies and tools that can be applied domestically and internationally. A recurring theme of recent events is the increasing recognition of the importance of economic factors on management and control decisions.

One of the clearest lessons learned is the importance of maintaining confidence in the safety of U.S. agriculture by both domestic and international customers. Recent experiences highlight the importance of potential gains that can be achieved by working with both foreign governments and international organizations and institutions, such as the OIE, to design the protocols used during disease events, especially as they relate to the determination of risk status and resulting trade conventions. Those processes must be supported by current, science-based analysis that is accepted by both the international organizations responsible for carrying out trade-affecting disease management and recovery protocols and by our trading partners. Given the importance of international trade to the United States and the interdependence that trade relations engender, the U.S. agricultural sector cannot ignore that it is part of an international system of agricultural systems. Given the global nature of diseases and agricultural commerce, continuing efforts to improve policies implemented by

international institutions and the use of scientifically sound protocols by our trading partners represent important opportunities for reducing disease risks and minimizing the subsequent consequences of disruptions in world markets.

Recognizing Public and Private Roles

Underlying almost all security lessons is the U.S. agricultural sector's reliance on private initiative and the importance of public/private partnerships that are most successful when guided by producer, processor, and consumer interests. Successful partnerships require sustained commitment of both private (producers and consumers) and governmental partners. Although public and private objectives are not always compatible, acknowledging and addressing the differences enables all parties to make better choices about where to allocate the resources needed to improve the readiness and resilience of the sector.

Defining the appropriate roles for enhancing the security of U.S. agriculture should reflect basic responsibilities and shared risks and burdens. While private interests are largely responsible for protecting property, proprietary information, and workers and customers through measures that manage risk and help ensure more resilient operations, public authorities are responsible for coordinating policies nationally and internationally and for filling those security gaps that cannot be effectively addressed by the private sector. Public/private partnerships are valuable aspects of any protection plan. These partnerships require the acceptance that successfully protecting agriculture from pests and diseases is a common effort and a shared responsibility between the Federal Government and State, local, and private entities. These efforts should be fostered to help coordinate and implement actions that will enhance our ability to effectively detect and respond to threats to the agricultural sector.

The foundation for the success of this approach is that market-directed responses are typically more effective and lead to greater resilience of individual firms and industries within the U.S. agricultural sector. A key objective for developing effective policy efforts is to match the economic incentives of producers and consumers to the extent possible. Toward that end, market-driven incentives should be the preferred means wherever possible so that the implementation of security-enhancing measures will dovetail with consumer and producer interests and complement other privately led security efforts.

In all cases, the provision of sound and accurate information is a critical element for protecting security interests. The outcry arising from the use of incorrect, uncertain, or emotionally charged information unnecessarily amplifies the sense of potential distress and hinders the development of effective responses. Whether it is a more accurate appraisal about contracting a disease or losing one's livelihood as a result of an event, consumers and producers benefit from the provision of science-based information that minimizes the sensationalism that wastes resources and impedes the execution of sound public policy.

The delivery of accurate information also plays a critical role in the formation of consumer confidence. As a result, answers to questions about who is responsible for providing information and the best way to provide that information to the public are critically important to designing policies that best serve the public interest. The benefits of information designed to better inform producers and consumers may go beyond meeting the immediate needs of producers, owners, or consumers residing in a particular region. As a result, protecting consumer confidence may warrant expanding investment in new information technologies through partnerships that effectively use limited public and private funding to improve information resources and foster the provision of accurate and timely information needed by everyone affected by an event.

Improving Deterrence and Prevention

Despite past successful efforts, U.S. agriculture faces increasing pressures from plant and animal pest introductions, many of which pose the threat of significant economic, environmental, and societal impacts. Given that recent outbreaks of plant and animal diseases have cost hundreds of millions of dollars to address, the public and private payoff for policies aimed at avoiding introductions and significant subsequent disruptions is substantial.

Since 2002, USDA has embarked on a number of efforts to improve deterrence and prevention measures. One example of these efforts is the development of the Food and Agriculture Biosecurity Information System (FABIS), which combines information collected by FSIS and APHIS and allows both agencies to more quickly identify naturally occurring or intentional acts affecting agriculture and USDA-regulated food products. This system benefits from the strength of USDA's laboratory networks and advances the Department's biosurveillance capacity and

analysis of global information streams on animal and plant health issues. Information from this program will also feed into the Department of Homeland Security's National Biosurveillance Integration System (NBIS).

As highlighted by the FABIS, dynamic deterrence and prevention measures require significant investments in laboratory networks, and legitimate partnerships between Federal and State laboratories to share resources and data. These efforts lead to the early detection of plant and animal disease outbreaks and determine the disease origins, which are critical to improved response efforts and reduced event impacts. Since the last farm bill, USDA has invested in enhanced networks and established detection and response capabilities using the national networks of Federal and State laboratories and other laboratory networks.

Two examples of these networks are the National Animal Health Laboratory Network (NAHLN) operated by APHIS, CSREES, and State collaborators, and the National Plant Diagnostic Network (NPDN), in which APHIS collaborates with CSREES and supports five regional coordination laboratories and one satellite lab. NAHLN currently consists of 49 State and university veterinary laboratories across the country with staff who are trained to detect emerging foreign animal diseases. The NPDN network provides a similar level of laboratory support to APHIS' Plant Protection and Quarantine (PPQ) program, which also supports training sessions and funds emergency programs, such as those leading the fight against Sudden Oak Death.

USDA's Highly Pathogenic Avian Influenza (HPAI) H5N1 Preparedness and Surveillance program, which is part of the U.S. National Strategy for Avian and Pandemic Influenza, represents another example of the Department's capacity to respond to disease threats and to work closely with other Federal, State, and international partners to help prevent the further spread of this dangerous disease abroad. This APHIS-led effort includes a CSREES-funded project to develop tests and vaccines for detection and disease transmission and control, and provide educational programs.

Surveillance and monitoring efforts are critical as trade and environmental conditions can aid the spread of diseases across international borders. Collaboration with international institutions and agencies in the development of disease protocols, cooperation, and partnerships is critical to improve our capacity to deter or prevent the introduction of diseases and pests. Work with international partners and other entities is best served when prevention measures are developed that incorporate lessons learned from other countries' experiences, share threat or risk information, and foster an environment that speeds the exchange of information.

The Security and Prosperity Partnership of North America represents a good example of collaboration with two of our most important trading partners to help eradicate animal and plant pests and diseases, and to improve security within the food and agriculture sector. This partnership, established in 2005 by President Bush, Canadian Prime Minister Paul Martin, and Mexican President Vicente Fox, recognizes North America's common agricultural security interests and has led to the creation of two multi-agency working groups led by DHS and the Department of Commerce on which USDA's participation is key. In coordination with DHS APHIS and FSIS work with Canadian and Mexican counterparts to identify areas of mutual interest and concern.

One efficient way to improve U.S. agricultural protection is to support efforts to manage and study locally endemic diseases and pests abroad. USDA has invested in overseas facilities because of the conviction that the best strategy for fighting potentially invasive species is to learn about them before they arrive. Similarly, many agri-businesses have also invested in foreign facilities that play critical roles in their risk-mitigation strategies. As should be expected, the potential gain from the use of these facilities relies heavily on cooperation with foreign and private sector partners.

Continued collaboration across departments within the Federal Government is also critical as the DHS is responsible for establishing and maintaining a comprehensive deterrence and prevention system at our ports. This effort is designed to prevent the accidental or intentional introduction of pests and diseases through those points of entry. This shared dependence and responsibility heightens the importance of sharing sensitive information, developing the systems and mechanisms needed to more effectively coordinate efforts to protect U.S. agriculture, and maintaining an accurate assessment of the potential threats.

Improving Detection and Response

Protecting agriculture is a national priority. Historically, USDA has raised awareness of vulnerabilities within U.S. agriculture and sought to improve its ability to detect and respond to threats or disease outbreaks. Most would probably agree that more can be done to promote an agricultural sector that is more nimble in its ability to detect events earlier and more resilient when events occur.

Advances in detection and response efforts are hallmarks of extension and Land-Grant systems and the public/private partnerships, including professional associations that have formed in response to pest or disease introductions. Integrating and exploiting the surveillance and laboratory capabilities of these investments strengthens detection and response capabilities. Monitoring potential plant and animal disease threats is also strengthened by continued support of education and training programs that ensure a steady supply of skilled professionals and that partnerships and alliances are able to more quickly and effectively undertake prevention efforts.

Continuing research on disease mechanisms and pathways is important. More needs to be learned about how the establishment, spread, and persistence of pathogens, diseases, and pests could affect production and competitiveness of U.S. agriculture nationally and within regions for specific production systems. The main Federal contribution is the ability to coordinate and support private efforts to enhance preparation and response to animal and plant disease introductions.

Within USDA, CSREES, ARS, RMA, and APHIS are working with the private sector to develop new monitoring tools for crop-based agriculture. One day this system will provide a critical real-time information mapping system that will allow disease experts to monitor crop disease developments and develop their own forecast tools. One achievement of this collaboration was the development and implementation of crop disease and risk management monitoring tools used to provide producers and their industry partners with soybean rust information they could use to make more informed decisions. This system saved soybean growers up to $300 million during the 2005 growing season by preventing unnecessary pesticide applications, according to ERS estimates. This system can also be used by farmers to document good farming practices for insurance purposes.

Several universities are also working with ARS as part of the Regional Dairy Quality Management Alliance. Programs in this alliance support efforts to monitor pathogen presence and help dairy producers assure product safety. This collaboration can be used to provide the data to identify and implement best management practices for commercial dairy cattle herds. Alliances such as these rely on trust between partners, as sharing data and business information is critical to the success of the efforts to evaluate and mitigate biosecurity concerns.

Many public/private partnerships, while still under development, provide important lessons about future policy directions. This is especially true when these programs are used to help determine and evaluate best practices and identify critical research security needs. In those cases the burdens and benefits of research efforts can be shared. As noted in the soybean rust case, cooperation and information sharing reduced the potential impact of the disease and allowed farmers to benefit from the adoption of better farming practices. Additional gains can be achieved by expanding these efforts to other crop and livestock production and processing industries, if the new initiatives share burdens and benefits of joint efforts and seek to identify improvements that provide the greatest benefit throughout the food supply chain and not just to limited aspects of the production system.

Improving Recovery and Management

The aim of recovery and mitigation policies should be to offer improved management options that reflect sound biological and economic considerations. The aim is not to return the affected industry to the point it was before an event, as that may be impossible and costly. Rather, the goal of recovery efforts should be to work within and around new production and market constraints to use public and private resources on actions that offer the most benefit for any given expenditure and that are market-driven.

Determining the expected benefits for any recovery effort begins with understanding the recovery goals and trade-offs from sector, industry, international, and consumer perspectives. The effect of recovery efforts on consumer demand and confidence, crop and livestock production, competitiveness, and international markets should be measured. It is within this context that the tensions of divergent recovery goals or even the attainability of those goals becomes apparent. It is also at this stage that the uncertain-

ty surrounding possible outcomes, including the possibility that an event cannot be contained or fully mitigated once introduced (e.g., karnal bunt), should weigh on recovery or relief decisions. Uncertainty and blind spots, if overlooked, could seriously affect future competitiveness and influence subsequent shifts in production and reactions of trading partners.

Compensation historically has been used to "make right" those harmed by disease outbreaks or natural disasters. Paragraph (e) of section 414 of the Plant Protection Act (7 U.S.C. 7715[e]) provides that the Secretary may pay compensation to any person for economic losses incurred by the person as a result of action taken by the Secretary in connection with the Secretary's determination that an extraordinary emergency exists because of the presence of a plant pest or noxious weed that is new to or not known to be widely prevalent in or distributed within and throughout the United States and that the presence of the plant pest or noxious weed threatens plants or plant products of the United States.

Even if the Secretary does not declare an extraordinary emergency, APHIS may provide payments for the recovery of lost production income if appropriated funds are made available for that purpose. Such funds have been made available in:

- The Consolidated Appropriations Act for FY 2000 (Pub. L. 106-113)
- The Agricultural Risk Protection Act of 2000 (Pub. L. 106-224) and
- The Department's 2001, 2003, 2004, and 2005 appropriations (Pub. L. 106-387, Pub. L. 108-7, Pub. L. 108-199, and Pub. L. 108-447)

From FY 2000 to May 2006, APHIS has provided $428 million in indemnity funding (Table 3). Funding for compensation from citrus canker represents almost 80 percent of total APHIS indemnity funding. Citrus canker is a bacterium that disfigures and weakens citrus trees. The pathogen was initially detected in Florida near the Miami airport in 1995. Prior to the 2004 and 2005 hurricanes, citrus canker was nearly eradicated. However, the 2004 and 2005 hurricanes spread citrus canker so extensively that it was determined that the established eradication program was no longer a scientifically feasible option to address citrus canker. The existing program was modified to stop destroying healthy trees and to eliminate the compensation provision. USDA has provided a total of approximately $374 million in compensation to producers and nursery owners affected by citrus canker. In addition, on June 7, 2006, USDA announced that an additional $100 million in funding to compensate commercial citrus growers in Florida for eligible losses resulting from the citrus canker eradication program is available, making USDA's contribution for indemnity payments for citrus canker in excess of $536 million.

Compensation remains an important policy option and may include insurance. Given the potential for significant economic losses, all compensation approaches must

TABLE 3. APHIS Indemnity Funding, FY 2000 - Present

PROGRAMS	Fiscal Year							
	2000	2001	2002	2003	2004	2005	2006 As of 5/02/06	Total
	THOUSAND DOLLARS							
CITRUS CANKER	14,571	52,654	10,064	11,801	15,997	29,224	239,874	374,185
KARNAL BUNT	0	122	39	2	0	0	0	163
BRUCELLOSIS	432	283	563	39	430	585	50	2,382
TUBERCULOSIS	158	16	2,846	21,299	9,002	5,293	8,969	47,582
SCRAPIE	8	70	1,081	1,010	545	1,021	182	3,916
TOTAL	**15,169**	**53,145**	**14,592**	**34,151**	**25,974**	**36,122**	**249,074**	**428,228**

be assessed on their ability to enhance recovery while being cost-effective and actuarially sound. Whatever approach is used, it should ensure that producers and consumers are responsible for protecting their interests through measures that enable them to most effectively manage the risks they face.

The availability and use of accurate information is essential to keep costs under control and prevent the introduction of policies that unintentionally reduce the long-term economic sustainability of sectors within U.S. agriculture. Where appropriate, the use of incentive-based programs should be implemented to encourage actions that speed recovery or improve the management of disruptive events. In general, the role of policy in this area is to promote the recognition of basic responsibilities and best practices, and to share risks and burdens equitably.

One difference between the risks associated with crop and animal diseases and other risks faced by producers is that unlike price/marketing risks, individual producer disease management practices change the risks faced by all producers in their communities or even industries. As a result, many standard approaches to government involvement in production, such as insurance programs or disaster payments that may ignore basic responsibilities may not be as effective or necessarily lead to the improved biosecurity in U.S. agriculture. More needs to be learned about differences between public and private interests as market-oriented approaches may mean that producers' observance of best practices may be a condition for future compensation.

Similarly, the need for greater accountability applies to the development and evaluation of programs designed to protect U.S. agriculture. These evaluations should include assessments of the impacts of government intervention on surrounding communities, consumers, producers, and related industries. Though difficult choices will have to be made, these assessments will provide great perspective and information about the factors that led to specific mitigation or prevention actions. While views among stakeholders may vary, more transparent assessments of policy actions are an important element in the development of trust and serve to recognize that in national security issues a broader range of stakeholders and interests exist.

Issues and Challenges for the 2007 Farm Bill

Farm policy and programs historically have played an essential role in strengthening and safeguarding U.S. agriculture. The 2007 Farm Bill discussion should consider ways to improve existing programs and institutions, and new efforts that more effectively address the challenges faced by U.S. agriculture.

Emphasizing sound science and private action. The most effective policies are likely to be those that utilize public/private partnerships and those crafted using the benefit of sound scientific information and analysis. One clear policy lesson of recent years is that the underlying economic incentives and pressures of private sector partners often place them in the best position to address their own needs, which in turn places them in a preeminent role of protecting U.S. agriculture. One way to assure that policies use those incentives and address the pressures faced across the sector is to ensure that protection programs provide incentives that are market-based.

Strengthening international organizations and capacities in foreign countries. Protection policies must also recognize the importance of cross-border and international vulnerabilities, and acknowledge the importance of strengthening the international institutions that develop and oversee the protocols that affect our trade opportunities. International institutions and collaborative opportunities should be fostered to protect U.S. agriculture by addressing risks and problems before they have a chance to reach our shores. A key strategy would be to focus sufficient resources to continue efforts to improve policies implemented by international institutions, promote the use of scientifically sound protocols by our trading partners, and assist resource-constrained foreign nations in addressing disease risks to minimize subsequent disruptions in world markets.

Investing in research and education. Another way to strengthen U.S. agriculture is to integrate and exploit the continued government investment in education and training programs. New investments should be based on filling the greatest gaps in understanding pathogens, diseases, and pests that affect the competitiveness of U.S. agriculture. As elsewhere, policies should be designed to coordinate and

support, rather than supersede, private efforts to enhance our ability to prepare for and respond to animal and plant disease introductions.

Providing accurate information. Finally, given that consumers largely drive the economic prospects of U.S. agriculture, consumer confidence is a critical element of U.S. agriculture's current and future success. Though it is impossible to prevent all disease and supply disruptions, and simply providing "correct" information may not be enough, the availability and delivery of accurate information to the public should be a foremost consideration. New educational information delivery technologies should be applied to advance the most effective means for providing timely and accurate information.

VI Preparing the Next Generation of Farmers and Ranchers

Issues which have been raised about the adequacy of the future workforce needed to farm the nation's agricultural lands include: (1) a potential divergence between the level of younger, new farm entrants into production agriculture and the exit of older retiring farmers, (2) the potential barrier to entry for new farmers created by rising farmland values and their effect on the capital costs of acquiring an efficient farm operation, (3) the rising complexity of farm production caused by changing markets, globalization, new technologies, economies of scale, environmental concerns, and other factors, and (4) uncertainties about the supply of future hired farm workers. This section examines the issue of the adequacy of a sufficient number of capable farmers and other farm workers for the future and the role of "beginning farmer" and related programs in addressing concerns about the future farm workforce.

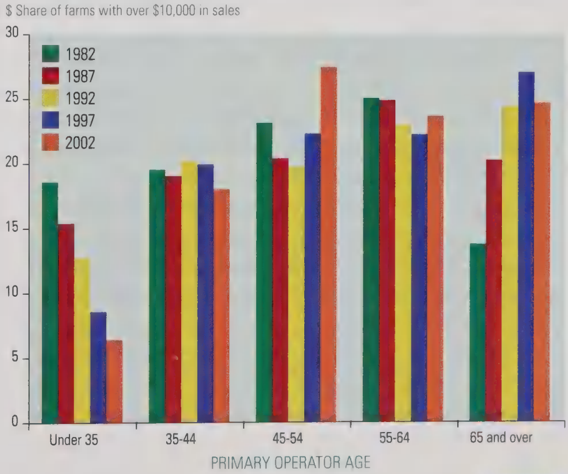
Background

Aging Farmers and Fewer Young Farm Entrants.

The average age of primary farm operators continues to rise, increasing by nearly 5 years from 50.5 in 1982 to 55.3 in 2002. For nearly one-fourth of all farms with over $10,000 in annual sales, the primary operator was over 65 years of age in 2002. The rise in the average age of primary operators is both a reflection of a decline in the number of young farmers and a rise in the number of older farmers. From 1982 to 2002, the number of primary operators under 35 years old declined while the number of farmers 65 and older increased. Farms with over $10,000 in annual sales and that were operated by those under 35 years of age accounted for less than 7 percent of all farms in 2002, as compared to 19 percent in 1982 (Figure 15). Meanwhile, the share of farms with over $10,000 in sales operated by farmers over 65 increased from 14 to 25 percent. The sharp decline in young farmers has raised concerns that an insufficient pool of new entrants will be available to replace a large and growing pool of retiring farmers.

There is no evidence, however, that a shortage of farm operators and farm workers has caused or will cause reduced production and higher prices of U.S. farm commodities. An Economic Research Service study released in 2006 on farm exits (farms going out of business) indicated that while the total number of U.S. farms declines very little in the 5 years between each Census, about 9-10 percent of farms go out of business each year, which was slightly greater than the entry rate. Thus, the apparent stability in the number of U.S. farms masks a rather dramatic turnover. Turnover rates are highest for smaller farms, but even for farms with sales of $250,000 or more, 6-7 percent go out of business each year. Thus, U.S. agriculture has been facing a substantial number of exits for many years, and as these farms have been sold to new businesses or existing farms, farms have gradually increased in size.

FIGURE 15. Farm Primary Operators by Age



There is also evidence that there are a substantial number of young farmers present on farms, though not as the primary operator. Data indicate that many commercial-sized farms with older operators also have younger operators involved in their operations. These secondary operators in many cases represent future primary operators. A high percentage of these farms are operated as partnerships and as family corporations. The 2002 Census indicated there were 194,000 farms that have multiple operators with operators across different generations.

Finally, the rising average age of primary operators may also reflect technology change that has enabled older farmers to more readily meet the physical demands of farm labor. Technology has reduced the time needed for field operations, allowing farm sizes to increase over time and operators to spend more time on other farm management tasks. Improving health, reflected in longer lives, also enables the workforce in general to work to a much older age.

While there is no apparent crisis of farm production likely to result from the advancing age of principal operators, there are concerns about how upcoming intergenerational transfers may affect the future structure of agriculture. Older farmers hold a large share of farm assets. Primary operators over the age of 65 owned over one-fourth of farm assets in 2004. Collectively, landowners over age 65 owned over one-third of the total acres of land in farms.

Ultimately, this pool of assets will either be sold or passed on to heirs. To the extent these assets are sold or leased to existing operators, this transfer raises concerns about consolidation and its effects on the structure of agriculture, local economies, and rural landscapes. Middle-sized family farms with annual sales of between $50,000 and $500,000 fell from 526,000 farms in 1982 to 380,000 in 2002. Meanwhile the number of large farms with over $500,000 in sales increased form 43,000 to 71,000 farms. This decline in middle-sized farms is one factor behind policies to encourage entry into agriculture or assist in the intergenerational transfer of farm assets. The concern about structure must be balanced against the economic effects of technology advancement and economies of scale, which enable agricultural demand to be met by larger, more efficient, and fewer farms.

Barriers to Entry. Another factor likely to affect the transfer of farm assets is the cost of farm production assets. In 2002, the value of land and buildings averaged $710,000 for U.S. farms that were principally engaged in agriculture. For farms where the principal operator was less than 35 years old, the value of land and buildings averaged $595,000. Farmland values have been increasing rapidly for many years, but surged ahead by 15 percent in 2005 after a 21- percent increase in 2004, adding to the cost of entering farming (Table 4). Thus, these figures represent a significant hurdle for many young farmers. However, renting land is a key option for young farmers, as nearly half of land in production is now rented. Moreover, while the average value of farm real estate increased 57 percent between 2002 and 2006, the average rental rate on crop land rose 10 percent.

Farm workers. Although 1.2 million workers were employed on farms and ranches during July 2006 (0.8 percent of the total U.S. employment), U.S. agricultural production overall is not heavily reliant on hired labor. Labor costs are only about 13 percent of total farm production expenditures. However, some segments of the agricultural economy and some regions of the country rely more heavily on hired labor. Labor costs approach or exceed 30 percent of total production costs for many horticultural crops, and labor costs exceed 20 percent of total farm production expenses in Arizona, California, Florida, Oregon, Washington, and many Northeastern States.

TABLE 4. Average Value of Farm Real Estate, 2002 - 2006

REGION	2002	2003	2004	2005	2006	% Change 05-06
	$/ACRE					
Northeast	3,000	3,200	3,550	4,110	4,550	10.7
Lake States	1,870	2,010	2,220	2,520	2,840	12.7
Corn Belt	2,030	2,130	2,300	2,720	3,040	11.8
Northern Plains	576	594	632	735	834	13.5
Appalachian	2,250	2,370	2,560	3,110	3,470	11.6
Southeast	2,140	2,270	2,420	3,530	4,420	25.2
Delta States	1,390	1,460	1,580	1,790	1,950	8.9
Southern Plains	755	788	832	1,000	1,190	19.0
Mountain	500	523	550	698	944	35.2
Pacific	2,240	2,350	2,480	3,120	3,290	5.4
48 States	1,210	1,270	1,360	1,650	1,900	15.2

Farms that hire labor sometimes use workers without proper documentation. The U.S. Department of Labor (DOL) reported that, in 2001-02, 53 percent of hired workers in the crop sector lacked work authorization. If that percentage is applied to the total hired workforce in agriculture, as many as 650,000 hired farmworkers may lack proper documentation. As concerns over homeland security and efforts to deter illegal immigration have increased, some farmers, particularly in the West, have indicated that hiring farmworkers has become more difficult and costly. Farm labor use in California, a State heavily reliant on immigrant workers, has declined compared with the rest of the United States. Farm labor use in California has fallen from about 380,000 workers in 2002 to fewer than 340,000 in 2005. In the rest of the United States, the amount of farm labor has remained relatively stable at about 1 million hired workers.

USDA programs and activities

While farm succession does not represent a crisis to the production of food and fiber, and legislative activity may address concerns over the hired farm workforce, uncertainty over these outcomes has motivated a number of programs to encourage Americans to take up careers as farmers and ranchers and help them succeed. The Agricultural Credit Improvement Act of 1992 was the first law that required USDA to provide special assistance to beginning farmers and ranchers. The law required the Secretary to establish: (1) beginning farmer loan programs; (2) Federal-State Beginning Farmer Partnerships for the purpose of providing joint financing to beginning farmers and ranchers; and (3) an Advisory Committee on Beginning Farmers and Ranchers. The Act also required that loan funds be targeted to beginning farmers and ranchers.

Credit programs. USDA implemented beginning farmer and rancher loan programs in FY 1994. From then through June 2006, the Farm Service Agency (FSA) has made more than 96,000 loans to beginning farmers and ranchers, totaling $8.5 billion. In FY 2006, 34 percent of all FSA direct and guaranteed loans have gone to beginning farmers and ranchers. FSA has also created Federal-State Partnerships by signing Memorandums of Understanding with 20 State beginning farmer programs, agreeing to provide joint financing to beginning farmers and ranchers. The Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) authorized the Secretary to establish a Beginning Farmer and Rancher Land Contract Guarantee Pilot Program in not fewer than five States during FYs 2003-2007. The program, implemented in September 2003, provides FSA guarantees on loans made by private sellers of a farm or ranch on a contract land sales basis to qualified beginning farmers and ranchers. The program is available in nine states. Two guaranteed loans have been made since implementation.

While not a USDA agency, the Farm Credit System (FCS) also makes loans to young farmers and ranchers (35 years old and younger) and beginning farmers and ranchers (operating for not more than 10 years). For example, in 2005, FCS institutions made 55,000 loans with a total loan dollar value of $8 billion to beginning farmers and ranchers. This lending represented 21 percent of the total number of new loans and 18 percent of total dollar volume of new loans made by FCS institutions in 2005. As of December 31, 2005, loans to beginning farmers and ranchers accounted for almost 24 percent of the total number of loans outstanding and 19 percent or almost $22 billion of the dollar value of loans outstanding in the FCS.

Advisory Committee. USDA established the Advisory Committee on Beginning Farmers and Ranchers (Advisory Committee) in 1998. The Advisory Committee provides advice to the Secretary on methods of maximizing opportunities for beginning farmers and ranchers. Members include representatives of FSA; CSREES; State beginning farmer programs; commercial lenders; private nonprofit organizations with active beginning farmer and rancher programs; community colleges or other educational institutions with demonstrated experience in training beginning farmers and ranchers; other entities or persons providing lending or technical assistance to beginning farmers and ranchers; and farmers and ranchers. The Advisory Committee meets annually, and USDA has implemented numerous recommendations that the Advisory Committee has submitted to the Secretary.

Conservation programs. The 2002 Farm Bill authorized the Secretary to provide higher payments to beginning farmers and ranchers in some of USDA's conservation programs. It also authorized the Secretary to provide incentives to beginning farmers and ranchers to participate in conservation programs to foster new farming and ranch-

ing opportunities and enhance environmental stewardship over the long term. Since FY 2003, the Natural Resources Conservation Service (NRCS) has approved $183 million in Environmental Quality Incentives Program (EQIP) contracts for beginning farmers and ranchers. In FY 2005 and 2006, NRCS invested $6.8 million and $10 million, respectively, in EQIP funds to assist limited-resource and beginning farmers and ranchers to implement conservation practices on their land. NRCS has also encouraged State offices to give extra points in their Farm and Ranch Protection Program ranking criteria for farms with succession plans.

Education. The 2002 Farm Bill also authorized the Secretary to establish a Beginning Farmer and Rancher Development Program to provide training, education, outreach, and technical assistance initiatives for beginning farmers and ranchers. No funds have been allocated to implement this program. However, CSREES provides grants to organizations that assist beginning farmers and ranchers through the (1) Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers Program (Section 2501) and (2) National Research Initiative Grants Program (Agricultural Prosperity for Small and Medium-Sized Farms). The 2002 Farm Bill authorized $25 million in annual appropriations for FY 2002 through 2007. Annual allocations have been approximately one-fourth that amount.

Risk management. New entrants into agriculture can participate in price and income support programs and crop insurance on the same terms as other producers. However, the Risk Management Agency (RMA) provides grants to organizations to assist beginning farmers and ranchers in risk management. Following recommendations of the Advisory Committee, RMA has targeted grant applicants that were sensitive to the needs of beginning farmers and ranchers and those that planned to partner with organizations that assist beginning farmers and ranchers. Seven organizations assisting beginning farmers and ranchers received grants in the first solicitation in 2003. Since then, RMA has continued to include beginning farmer and rancher language in its annual grant solicitations, including the Community Outreach and Assistance Partnership Program Announcement published March 1, 2006. On June 16, 2006, RMA also announced a rural initiative for new farmers, making available $500,000 to fund educational programs to teach refugees and other low-income individuals who produce specialty crops about risk management and good business practices.

Departmental Policy. In 1999, USDA implemented Departmental Regulation (DR) 9700-1, "Small Farms Policy." The Advisory Committee recommended USDA develop and implement a mission focus to heighten awareness and coordinate beginning farmer and rancher opportunities, similar to that established in DR 9700-1 for small farms. On August 3, 2006, DR 9700-1 was amended to become a "Small Farms and Beginning Farmers and Ranchers Policy." This has resulted in a Small Farms and Beginning Farmers and Ranchers Council, and requires beginning farmers and ranchers policy to be reflected in all USDA mission area and agency statements, strategic plans, performance plans, and performance goals.

Farm workers. The Department of Labor (DOL) administers, in consultation with USDA, the Temporary Nonimmigrant Worker Program (H-2A) that allows farmers to legally use workers from outside the United States. Farmers must recruit domestic workers and demonstrate that domestic workers are not available. Farmers must pay transportation costs and provide housing and meals or cooking facilities for the temporary workers. They must also pay a wage rate that is established by the DOL so that it will not depress wages of similarly employed domestic workers. The program is not widely used because of its complexity, cost, and historical lack of enforcement against individuals without proper documentation. In FY 2005, DOL certified requests for 48,000 workers under the H-2A program.

The Administration has proposed a comprehensive immigration reform program that includes securing U.S. borders, enforcing immigration laws at the worksite, resolving the status of illegal immigrants currently in the United States, and creating a temporary worker program. The program would alleviate many of the concerns about the farm work force by providing temporary legal residency for willing workers who are matched with willing employers. The House and the Senate each passed immigration reform legislation in 2006 that has yet to be reconciled.

USDA's Rural Development administers the Farm Labor Housing Loan and Grant Program which provides financing for housing for domestic farmworkers. Loans are made to farmers, associations of farmers, family farm corporations, Indian tribes, nonprofit organizations, public agencies, and associations of farmworkers. Grants are made to farmworker associations, nonprofit organizations, Indian tribes, and public agencies. Funds may be used in urban areas for nearby farm labor. The loans and grants may be used to buy, build, improve, or repair housing for farm laborers and those engaged in on-farm processing. Funds can be used to purchase a site or a leasehold interest in a site; to construct housing, day care facilities, or community rooms; to pay fees to purchase durable household furnishings; and to pay construction loan interest.

Issues and Challenges for the 2007 Farm Bill

The primary forces for assuring an adequate supply of farmers are market incentives. If agricultural production provides a sufficient rate of return, capital investment and people will enter farm production. Low rates of return will discourage investment and cause farm failures. Competition will drive successful producers to adopt technology and achieve efficient operations, while inefficient producers will exit agriculture. The operation of these market forces is critically important for growth, productivity gains, and ensuring affordable food for Americans. Nevertheless, the structural changes that have accompanied the growth in agriculture have led policymakers in recent years to support specific Federal programs and policies that aid new farm formation or the successful succession of farms from one generation to the next. These specific policies are delivered directly through government programs or indirectly through the tax code.

The 2007 Farm Bill could consider current or new programs to assist in the transition of retiring and exiting farmers and the entry of beginning farmers. Efforts to encourage farm transfers could be considered, including working with and supporting state governments and community organizations that would provide the front-line interaction with producers to facilitate transition. Targeted financial assistance, such as continued or expanded credit assistance, and other financial incentives, such as in risk management and conservation programs, represent options to assist in transition of farm assets. An initiative in research, education and outreach to address the needs of farmers in transition could also be beneficial. Such efforts can help production assets pass from one generation of farmers to a new generation and assist the new generation in getting started effectively.

However, assistance to targeted groups of producers must be balanced against budget limits and not offset market incentives. Little good is accomplished by helping someone enter agriculture who does not have the capacity to succeed. Excessive support may also be inequitable to producers who do not quite qualify for eligibility in the targeted group. Some general alternative approaches follow.

Facilitating the transfer of farms to new farmers. Increasing USDA's statutory loan limits would enable direct programs to serve broader clientele and meet beginning farmers' financing needs. Direct operating loan (OL) caps were last increased in 1984 and direct farm ownership (FO) loan caps were last increased in 1978. Consequently, the credit needs of many full-time young farmers exceed the $200,000 maximum direct loan limits. However, increases in statutory loan authority would limit loan fund availability for smaller operations if budget authority were not increased. Also, the increased debt load would result in higher potential risk exposure. In addition to higher loan limits, young or beginning farmers who buy land could be provided flexible repayment schedules such as graduated payment, ballooned, or interest-only mortgages. However, each of these options would increase credit risk relative to current programs and thus require an increase in budget authority.

Reducing reliance on direct loans. Young and beginning farmers rely heavily on direct lending, which has high administrative and loan subsidy costs. Incentives could be considered which encourage lenders to make greater use of the guaranteed program in financing young or beginning farmers, thus reducing the need for more costly direct loans. In addition, interest rate subsidies could be provided to beginning farmers receiving guaranteed loans. Another option would be to expand the guarantee to include annual payments. For guaranteed loans made to beginning farmers to purchase farmland, Farm Service Agency (FSA) could agree to advance one annual payment during the first 5 years of the loan, should the borrower's financial condition

ever preclude them from meeting their obligations. As this would increase risk exposure, higher subsidy rates would result, requiring greater budget authority.

Another alternative would be to encourage State, community, or other non-government organizations (NGOs) to become involved in programs to assist new or beginning farmers. Matching loan funds could be provided to State lending programs or NGOs making loans to qualified beginning farmers. If these lenders also service the account, Federal Government delivery costs would be reduced.

Rather than direct loans, grants may be considered as a method of delivering benefits to new or beginning farmers. With grants, there are no continuing loan servicing costs and no risk of additional financial losses occurring due to unexpected declines in incomes or asset values. Beginning farmer grants could be used to purchase land, procure financial or technical training, or buy down interest rates on commercial loans. The grant could also be used to match a farmer's savings in a Beginning Farmer and Rancher Individual Development Account Program that would establish a pattern of savings to promote a new generation of farmers and ranchers.

Providing research, education, and outreach to address the needs of farmers in transition. Many socially disadvantaged, limited-resource, and small and beginning farmers may lack technical expertise to achieve financially sound farming operations. There are many non-Federal groups with the expertise to accomplish outreach objectives. Through continuation of programs such as the Outreach and Technical Assistance for Socially Disadvantaged Farmers & Ranchers (Section 2501), and the Beginning Farmer Development Program, USDA can leverage resources with those provided by States and NGOs to provide technical assistance to new farm entrants.

Enhancing benefits under USDA risk management programs. Financial enhancements have been suggested for beginning or young farmers acquiring farmland with base acres and who meet pre-determined requirements with respect to farm size or wealth. As examples, the percentage of enrolled base acres that are ineligible for direct and counter-cyclical payments m4ay be reduced from the current 15 percent to something less, certain beginning farmers could be made eligible for higher farm program payment limitations, and enhancements could be provided to certain young or beginning farmers purchasing crop insurance. However, there are several important concerns with such farm program enhancements that should be considered, including their budgetary impacts, whether providing high farm program benefits per unit of production to one group of producers over another is equitable, and that such subsidization may be inconsistent with resource allocation signals that market forces may be sending.

VII Suggestions for Further Reading

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Rubenstein, Kelly Day, Paul Heisey, Robbin Shoemaker, John Sullivan, and George Frisvold. Crop Genetic Resources: An Economic Appraisal Economic Information Bulletin No. (EIB2), 47 pp, May 2005. **http://www.ers.usda.gov/Publications/eib2/**

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